PRUNUS TRILOBA.

SB450.95
.I45
1884-88
v.6

THE

ILLUSTRATED

DICTIONARY OF GARDENING,

A PRACTICAL AND SCIENTIFIC

Encyclopædia ✣ of ✣ Horticulture

FOR

GARDENERS AND BOTANISTS.

MISSOURI
BOTANICAL
GARDEN.

EDITED BY

GEORGE NICHOLSON, A.L.S.,

Curator, Royal Botanic Gardens, Kew.

ASSISTED BY PROFESSOR J. W. H. TRAIL, A.M., M.D., F.L.S., IN THE PARTS RELATING TO INSECTS, FUNGI, PLANT STRUCTURE, HORTICULTURAL CHEMISTRY, &C.; AND J. GARRETT IN THE FRUIT, VEGETABLE, AND GENERAL GARDEN WORK PORTIONS.

DIVISION VI.—PIN TO SCL

PUBLISHED BY

L. UPCOTT GILL, 170, STRAND, LONDON, W.C.

GENERAL AGENT,

A. W. COWAN, 30 AND 31, NEW BRIDGE STREET, LUDGATE CIRCUS, LONDON.

LONDON : PRINTED BY A. BRADLEY, 170, STRAND.

REFERENCE TO ILLUSTRATIONS OF PLANTS OTHER THAN THOSE FIGURED IN THIS WORK.

IT has been suggested, by an eminent Authority, that many readers would be glad to be informed where reliable Illustrations could be found of those Plants which are not figured in this Work. To meet this want, references to the figures in Standard Authorities have been given, the titles of the Works referred to being, for economy of space, abbreviated as follows:

A. B. R. .. Andrews (H. C.). Botanist's Repository. London, 1799-1811. 10 vols. 4to.
A. E. .. .. Andrews (H. C.). Coloured Engravings of Heaths. London, 1802-30. 4 vols. 4to.
A. F. B. .. Loudon (J. C.). Arboretum et Fruticetum britannicum. London, 1838. 8 vols. 8vo.
A. F. P. .. .. Allioni (C.). Flora pedemontana. Aug. Taur., 1785. 3 vols. Fol.
A. G. .. .. Aublet (J. B. C. F.). Histoire des Plantes de la Guiane française. Londres, 1775. 4 vols. 4to.
A. H. .. .. Andrews (H. C.). The Heathery. London, 1804-12. 4 vols. 4to.
B. .. .. .. Maund (B.). The Botanist. London, 1839. 8 vols. 4to.
.. Brandis (D.). Forest Flora of . . . India. London, 1876, 8vo. Atlas 4to.
B. .. Beddome (R. H.). Flora sylvatica. Madras [1869-73]. 2 vols. 4to.
B. H. .. .. La Belgique Horticole. Ghent, 1850, &c. 8vo.*
B. M. .. .. Botanical Magazine. London, 1787, &c. 8vo.*
B. M. Pl. .. Bentley (R.) and Trimen (H.). Medicinal Plants. London, 1875-80. 8vo.
B. O. .. .. Bateman (James). A Monograph of Odontoglossum. London, 1874. Fol.
B. R. .. .. Botanical Register. London, 1815-47. 33 vols. 8vo.
B. Z. .. .. Botanische Zeitung. Berlin, vols. i.—xiii. (1843-55). 8vo. Leipzig, vol. xiv. (1856).*
C. H. P. .. Cathcart's Illustrations of Himalayan Plants. London, 1855. Fol.
Enc. T. & S. Loudon (J. C.). Encyclopædia of Trees and Shrubs. London, 1842. 8vo.
E. T. S. M. .. *See* T. S. M.
F. A. O. .. Fitzgerald (R. D.). Australian Orchids. Sydney, 1876. Fol.*
F. D. .. .. Flora Danica—usually quoted as the title of the work, Icones plantarum . . . Daniæ et Norvegiæ. Havniæ, 1761 to 1883. Fol.
F. d. S. .. .. La Flore des Serres et des Jardins de l'Europe. 1845-82. 23 vols. 8vo.*
Fl. Ment. .. Moggridge (J. T.). Contributions to the Flora of Mentone. London, 1864-8.
Flora .. .. Flora oder allgemeine botanische Zeitung. 1818-42. 25 vols. 8vo. [New Series] 1843, &c.*
F. M. .. .. Floral Magazine. London, 1861-71, 8vo. 1872-81, 4to.
F. & P. .. .. Florist and Pomologist. London, 1868-84. 8vo.
G. C. .. .. The Gardeners' Chronicle and Agricultural Gazette. London, 1841-65. Fol.
G. C. n. s. .. The Gardeners' Chronicle. New Series, 1866, &c. Fol.*
G. G. .. .. Gray (A.). Genera Floræ Americæ. Boston, 1848-9. 2 vols. 8vo.
G. M. .. .. The Gardeners' Magazine. Conducted by Shirley Hibberd. London.*
G. M. B. .. The Gardeners' Magazine of Botany. London, 1850-1. 3 vols. 8vo.
Gn. .. .. .. The Garden. London, 1871, &c. 4to.*
G. W. F. A. .. Goodale (G. L.). Wild Flowers of America. Boston, 1877. 4to.
H. B. F. .. Hooker (W. J.). The British Ferns. London, 1861. 8vo.
H. E. F. .. Hooker (W. J.). Exotic Flora, Edinburgh, 1823-7. 3 vols. 8vo.
H. F. B. A. .. Hooker (W. J.). Flora boreali-americana. London, 1833-40. 2 vols. 4to.
H. F. T. .. Hooker (J. D.). Flora Tasmaniæ. London, 1860. 2 vols. 4to. This is Part 3 of "The Botany of the Antarctic Voyage of H.M. Discovery Ships *Erebus* and *Terror*, in the years 1839-43."
H. G. F. .. Hooker (W. J.). Garden Ferns. London, 1862. 8vo.
H. S. F. .. Hooker (W. J.). Species Filicum. London, 1846-64. 5 vols. 8vo.
I. H. .. .. L'Illustration Horticole. Gand, 1850, &c. 8vo.
I. H. n s. .. L'Illustration Horticole. New Series. 8vo.*
I. H. Pl. .. *See* C. H. P.
J. B. .. .. Journal of Botany. London, 1863. 8vo.*
J. F. A. .. .. Jacquin (N. J.). Floræ austriacæ . . . Icones. Viennæ, 1773-8. 5 vols. Fol.
J. H. .. .. Journal of Horticulture and Cottage Gardener. Conducted by Dr. Robert Hogg. London, 1849, &c. 4to.*
J. H. S. .. .. Journal of the Horticultural Society. London, 1846, &c. 8vo.*
K. E. E. .. Kotschy (Theodor). Die Eiche Europa's und des Orient's. Wien, Olmüz, 1858-62. Fol.
L. B. C. .. .. Loddiges (C.). Botanical Cabinet. London, 1812-33. 20 vols. 4to.
L. C. B. .. .. Lindley (J.). Collectanea botanica. London, 1821. Fol.
L. E. M. .. La Marck (J. B. P. A. de M. de). Encyclopédie methodique . . . Botanique. Paris, 1783-1817. 13 vols. 4to.
L. J. F. .. .. Lemaire (C.). Le Jardin fleuriste. Gand, 1851-4. 4 vols. 8vo.
L. R. .. .. Lindley (J.). Rosarum Monographia. London, 1820. 8vo.
L. S. O. .. .. Lindley (J.). Sertum Orchidaceum. London, 1838. Fol.
L. & P. F. G. Lindley (J.) and Paxton (J.). Flower Garden. London. 1851-3. 3 vols. 4to.
M. A. S. .. Salm-Dyck. Monographia Generum Aloes et Mesembryanthemi. Bonnæ, 1836-63. 4to.
N. .. .. .. Burbidge (F. W.). The Narcissus: Its History and Culture. With a Scientific Review of the Genus by J. G. Baker, F.L.S. London, 1875. 8vo.
N. S. .. .. Nuttall (T.). North American Sylva. Philadelphia, 1865. 3 vols. 8vo.
P. F. G. .. *See* L. & P. F. G.
P. M. B. .. Paxton (J.). Magazine of Botany. London, 1834-49. 16 vols. 8vo.
Ref. B. .. .. Saunders (W. W.). Refugium botanicum. London, 1869-72. 8vo.
R. G. .. .. Regel (E.). Gartenflora. Erlangen, 1852, &c. 8vo.*
R. H. .. .. Revue Horticole. Paris, 1852.*
R. S. H. .. Hooker (J. D.). The Rhododendrons of Sikkim-Himalaya. London, 1849-51. Fol.
R. X. O. .. Reichenbach, *fil.* (H. G.). Xenia Orchidacea. Leipzig, 1858. 4to.*
S. B. F. G. .. Sweet (R.). British Flower Garden. London, 1823-9. 3 vols. 8vo.
Second Series. London, 1831-8. 4 vols. 8vo.
S. C .. .. Sweet (R.). Cistineæ. London, 1825-30. 8vo.
S. E. B. .. .. Smith (J. E.). Exotic Botany. London, 1804-5. 2 vols. 8vo.
S. F. A. .. .. Sweet (R.). Flora australasica. London, 1827-8. 8vo.
S. F. d. J. .. Siebold (P. F. de) and Vriese (W. H. de). Flore des Jardins du Royaume des Pays-Bas. Leide, 1858-62. 5 vols. 8vo.
S. F. G. .. .. Sibthorp (J.). Flora græca. London, 1806-40. 10 vols. Fol.
S. H. Ivy. .. Hibberd (Shirley). The Ivy: a Monograph. London, 1872. 8vo.
Sw. Ger. .. Sweet (Robert). Geraniaceæ, the Natural Order of Gerania. 1828-1830.
Sy. En. B. .. Syme (J. T. B.), *now* Boswell. English Botany . . . Ed. 3. London, 1863-85. 12 vols. 8vo.
S. Z. F. J. .. Siebold (P. F. von) and Zuccarini (J. G.). Flora Japonica. Lugd. Bat., 1835-44. Fol.
T. H. S. .. .. Transactions of the Horticultural Society. London, 1805-29. 7 vols. 4to.
T. L. S. .. .. Transactions of the Linnæan Society. London, 1791-1875. 30 vols. 4to.*
T. S. M. .. Emerson (G. B.). Trees and Shrubs . . . of Massachusetts. Boston. Ed. 2, 1875. 2 vols. 8vo.
W. D. B. .. Watson (P. W.). Dendrologia Britannica. London, 1825. 2 vols. 8vo.
W. F. A. .. *See* G. W. F. A.
W. O. A. .. Warner (R.) and Williams (B. S.). The Orchid Album. London, 1882. 4to.*
W. S. O. .. Warner (R.). Select Orchidaceous Plants. London.
Series i, 1862-65. Fol.
Series ii, 1865-75. Fol.
W. & F. .. Woods and Forests. 1883-4. 1 vol. 4to.

* Is still in course of publication.

Pinus—*continued.*

FIG. 183. BRANCH OF PINUS PYRENAICA BRUTIA.

P. rigida (stiff). *l.* light green, rigid, triquetrous, with roundish edges, sharp-pointed, from 3in. to 5in. long. *cones* ovoid, about 3in. long; scales terminating in sharp, hooked prickles. *h.* 70ft., but only from 30ft. to 45ft. in England. Eastern United States, 1759. This species is much branched at the top, and forms a dense head.

FIG. 184. CONE OF PINUS SABINIANA (much reduced).

P. Sabiniana (Sabine's). *l.* glaucous-bluish-green, rather flaccid, pendulous, slightly twisted, rounded on the outer, and with a prominent rib on the inner, side. *cones* from 7in. to 9in. long, 5in. to 7in. in diameter, very resinous; scales hard, strong, large, terminating in a sharp, hard, solid point. Branches horizontal, usually having a bare appearance. *h.* 40ft. to 60ft. California, 1832. "In England, it is tolerably hardy, but somewhat fastidious as to soil and situation. In favourable spots, where it has attained a considerable size, it proves to be a very distinct, and by no means inelegant, tree, its long, pendulous leaves and slender but crooked branches being notable characteristics; but all defects are amply atoned for by its fine cones, which almost rival those of *P. macrocarpa* [*P. Coulteri*] in size and colour" (Veitch). See Fig. 184.

P. Sinclairiana (Sinclair's). A synonym of *P. ponderosa*.

Pinus—*continued.*

P. Strobus (Strobus).* Weymouth Pine. *l.* light green, marked with silvery lines, slender, soft, 3in. to 5in. long. *cones* cylindrical, tapering, slightly curved, 6in. to 8in. long; scales smooth, thickened at the apex. Branches often short. *h.* 120ft. to 160ft. North America, 1705. A handsome tree, but inferior

FIG. 185. PORTION OF BRANCHLET, WITH TWO CLUSTERS OF LEAVES, OF PINUS STROBUS.

to *P. excelsa*, to which it is very closely allied. See Fig. 185. The variety *nana* is a small, compact, bushy shrub, with short, slender branches and numerous branchlets. The leaves are shorter than those of the species, and densely clustered at the extremities of the branchlets. There are several other but inferior varieties.

FIG. 186. CONE OF PINUS SYLVESTRIS.

P. sylvestris (sylvan).* Deal Wood; Fir-tree; Scotch or Wild Pine. *l.* dense, of a glaucous hue, from 1½in. to 2in. long, but shorter on old trees; sheaths small, persistent, nearly black. *cones* solitary or two or three together, about 2in. long, tapering towards the apex; tops of the scales elevated and ridged, with a square or triquetrous outline, and a small shield with a

FIG. 187. BRANCHLET AND CONES OF PINUS SYLVESTRIS.

Pinus—*continued.*

deciduous point; seeds winged. Branches spreading, short, the lower ones dying off when in a young state. *h.* 50ft. to 100ft. Britain. A well-known tree, of which there are several varieties of little value. It grows best in a peaty soil, where the Heath acts as cover, and affords protection to the young plant, which is better adapted for it than close herbage. When shifted to different soil, the quality of the tree often degenerates, and the wood becomes whiter and softer than in the original type. See Figs. 186 and 187. (Sy. En. B. 1380.)

P. s. altaica (Altaian). A compact, pyramidal tree, with much shorter and stiffer leaves. *h.* 50ft. Altai Mountains.

P. s. argentea (silvery). Cones and leaves of a beautiful silvery hue.

FIG. 188. PINUS SYLVESTRIS FASTIGIATA.

P. s. fastigiata (pyramidal). A form only differing from the type in its columnar habit. See Fig. 188.

P. s. horizontalis (horizontal). *l.* broader and more glaucous than in the type. *cones* thicker, less pointed. Branches quite horizontal.

P. s. latifolia (broad-leaved). A robust and rapid-growing form, having much broader, more glaucous, and longer leaves than any other variety of *P. sylvestris*.

P. s. monophylla (one-leaved). A singular variety. The leaves are "attached to each other throughout their length, and have the appearance of being united; but by giving them a twist, they separate into two, like the ordinary Scotch Fir" (Gordon, "Pinetum").

Pinus—*continued.*

P. s. variegata (variegated). *l.* variegated with pale straw-colour.

P. tuberculata (tubercled). *l.* deep green, triquetrous, with an elevated rib running along the middle on the under side, twisted, the edges scabrous. *cones* varying in size, from 4in. to 8in. long; scales very prominent, deeply divided from each other. *h.* 25ft. to 40ft. California, 1847. A handsome species when in a young state.

Several species, not mentioned in the foregoing list, are occasionally seen in cultivation, but they are, as a rule, too tender for our climate; and several others are of no horticultural value.

PIONANDRA. A synonym of **Cyphomandra** (which *see*).

PIONEA FORFICALIS (Garden Pebble Moth). An insect living, in the larval state, on the leaves of Cabbages and Horse-radish, as well as on Hedge Mustard and other uncultivated *Cruciferæ*. The moth is common throughout the country. It is a little over 1in. in spread of wings. The front wings are rather pointed at the tip, and in colour are dull straw-yellow, shaded with pale brown; a brown line runs from the tip to the middle of the inner margin, and another nearly parallel to it, but paler brown, crosses the middle of the wing, widening towards the front margin into a dark, ill-defined spot. There are also one or two other less distinct lines, running in the same general directions with these. The body is pale, shining straw-yellow in colour, as are also the hind wings, which have a brown marginal line, and a brown line running parallel with it. The larva has six true legs and ten prolegs; it is yellowish-green, with a darker green line down the middle of the back, and one along each side, bordered above with a white line. The head is brown. There are usually two broods in the year. Some moths emerge in May. They lay eggs, and from these emerge larvæ, which feed on the plants named above, usually between the leaves, under protection of a thin web of threads. They turn, in the soil, into pupæ, from which moths emerge about August. These produce a new brood of larvæ, which feed up in autumn, to become moths in the following May. The damage done by the moths is seldom serious, though the larvæ are troublesome in often being boiled between the leaves of Cabbages and served at table. The only practicable remedies are picking off the larvæ and catching and killing the moths.

PIONY. *See* **Pæonia.**

PIOPHILA APII (Celery-stem Fly). A fly which has been described by Professor Westwood, in the "Gardeners' Chronicle," as injurious to Celery. The yellowish-white maggots burrow, during winter and spring, in the stems, eating their way upwards, and leaving burrows of a rusty-red colour in the tissues. They are blunt behind, but taper in front, and have two black hooks in the front end. The maggots change into pupæ in the stem, and the flies emerge in May. They are of a glossy black colour, with a coat of golden-grey hairs; the head is chestnut-brown, with a black apex; the two wings are clear, with yellow veins; and the legs are straw-coloured, with dusky feet. The spread of wings is a little over ¼in., the length of head and body hardly ¼in.

Remedy. The only useful remedy seems to be the burning of all plants showing signs of disease, to prevent the injury from spreading.

PIPER (old Latin name, akin to the Greek *Peperi*, and Sanscrit *Pippala*). Pepper. Including *Artanthe, Chavica, Cubeba, Pothomorphe, &c.* ORD. *Piperaceæ*. A vast genus (upwards of 600 species have been described) of stove, rarely nearly hardy, shrubs, sometimes climbing, rarely trees or tall herbs, with branches often articulated at the nodes; they are broadly dispersed over the warmer regions of the globe, and are very numerous in tropical America. Flowers hermaphrodite or unisexual, densely cylindrical-spicate or rarely sub-racemose, subtended by peltate, adnate, or concave bracts; perianth none;

Piper—*continued.*

stamens two to four, rarely five or many; spikes pedunculate or rarely sub-sessile. Leaves alternate, entire or (in one species) trifid, stalked; stipules adherent to the leaf-stalk, or opposite, and deciduous. Few of the species have any horticultural importance, but some of them are of great economic value. The Pepper of commerce (*P. nigrum*) is imported in enormous quantities. It is also employed as an acrid stimulant in cases of impaired digestion, and it has been recommended, in cases of ague, to prevent the paroxysm. *P. nigrum* and the rest of the stove species grow freely in a well-drained, rich, loamy soil. The others thrive in almost any soil, in a cooler temperature. All are propagated by cuttings of the half-ripened shoots, inserted in sandy soil, under a bell glass.

Piper—*continued.*

P. Betle. Betel Pepper. *fl.*, catkins opposite the leaves, peduncled, greatly enlarged in fruit, pendent. *l.* alternate, distichous, cordate-ovate, 4in. to 7in. long, acuminated at apex, oblique at base; petioles rounded, stipuled when young. Stems trailing or climbing to a great height. East Indies, 1804. Stove. This species yields the Betel Leaf of the South Asiatics—almost as extensive an article of commerce as Tobacco is in the West. (B. M. 3132.)

FIG. 189. BRANCH OF PIPER PORPHYROPHYLLUM.

P. borneense (Bornean). *l.* large, of a rich dark green, with broad but faint silvery-grey stripes between the eleven nerves, rugose and glabrous above, hairy-pubescent beneath. Stem thick, hairy. Borneo, 1882. A dwarf, stove, herbaceous species.

P. decurrens (decurrent).* *l.* green, shaded with metallic iridescence, large. Stem stout, pale green, mottled with white spots and black lines. Columbia, 1876. A distinct and splendid stove plant. (I. H. 239.) SYNS. *Artanthe decurrens* and *A. magnifica.*

P. excelsum aureum-pictum (tall, golden-painted).* *l.* with a large, creamy blotch, broadly ovate-cordate, acuminate, 3in. to

Piper—*continued.*

5in. long; petioles 1in. to 2in. long, winged by the adnate stipules at their bases. New Zealand. A very aromatic, greenhouse bush or small tree.

P. Futokadsura (Futokadsura).* *fl.* greenish, succeeded by bright red fruit. *l.* ovate-lanceolate, acuminate, entire, about 3in. broad, glabrous. Branches slender. Japan, 1869. A remarkable, nearly hardy, deciduous shrub, very like *P. nigrum.*

P. nigrum. Black, or Common Pepper. *fl.*, catkins 3in. to 6in. long. *fr.* first green, then red, afterwards black. *l.* 4in. to 6in. long, alternate, distichous, broadly ovate, acuminate; petioles rounded, ½in. to nearly 1in. long. Stem trailing or climbing, flexuous. East Indies, 1790. The fruit of this species forms the well-known condiment. White Pepper is the same fruit, but deprived of its external coat. (B. M. 3139; B. M. Pl. 245.)

P. porphyrophyllum (purple-leaved).* *l.* cordate-orbicular, shortly cuspidate, 4in. to 6in. long, 3½in. to 5in. broad, rich deep bronzy-green above, beautifully marked with numerous, small, pink spots, which are thickly clustered along the course of the nerves, and a few scattered between them; under surface dull purple. Malay Peninsula (?). Stove climber. See Fig. 189. (F. d. S. 1491; R. H. 1883, 560.) SYN. *Cissus porphyrophyllus*, of gardens.

P. rubronodosum (red-noded). *l.* deep sap-green, when young frosted over with silver-grey; petioles pubescent. Stems fleshy, scabrous, red at the nodes. Columbia, 1877. A distinct, stove shrub.

PIPERACEÆ. A natural order of herbs, shrubs, or very rarely trees, often aromatic or stimulant, broadly dispersed over the globe. Flowers hermaphrodite or unisexual, small, often minute, variously disposed, scattered or dense, in spikes or rarely racemes, and furnished with a frequently peltate bract; perianth (except in one genus) absent; stamens two to six, or very rarely seven or eight (or one?), hypogynous; filaments free, or rarely adnate to the base of the ovary. Fruit small, capsular or baccate. Leaves alternate, or rarely opposite or three or four in a whorl, entire or very rarely trifid, three or many-nerved, or penniveined, sometimes pellucid-dotted or succulent; stipules, when present, adnate to the petioles, or dilated at base and reduced to an amplexicaul petiole, or connate and opposite the leaves. Among the most important economical products of *Piperaceæ* are Pepper and Betel. An acrid resin and a volatile, aromatic oil are possessed by the plants. The order comprises about eight genera and nearly 1000 species. Illustrative genera are: *Houttuynia*, *Peperomia*, and *Piper.*

PIPERELLA. A synonym of **Micromeria** (which *see*).

PIPE-TREE. *See* **Syringa vulgaris.**

PIPEWORT. *See* **Eriocaulon.**

PIPPERIDGE, or **PIPRAGE.** A common name for *Berberis vulgaris.*

PIPTADENIA (from *pipto*, to fall, and *aden*, a gland; referring to the falling gland of the anthers). ORD. *Leguminosæ.* A genus comprising about thirty species of unarmed or prickly, stove shrubs or trees, two of which are natives of tropical Africa, and the rest inhabit the warmer regions of America. Flowers white or greenish, small, uniform, hermaphrodite or subpolygamous, sessile or pedicellate, disposed in cylindrical spikes or globose heads; peduncles axillary, solitary or fasciculate, the uppermost ones at the tips of the branches, often paniculate. Pods stipitate or rarely sessile, broadly linear, flat, membranous or coriaceous. Leaves bipinnate; leaflets small and many-jugate, or rarely large and few-jugate. For culture of the species described below, *see* **Adenanthera.**

P. latifolia (broad-leaved). *fl.* spicate; spikes shorter than the leaves, axillary or in terminal panicles. *l.* bipinnate, tri- or quadri-jugate, glabrous, often slightly glaucescent beneath; leaflets two, three, or many-jugate, obovate-elliptic, slightly acute. *h.* 4ft. Brazil, &c., 1820.

PIPTANTHUS (from *pipto*, to fall, and *anthos*, a flower; the teeth of the calyx, as well as the petals and stamens, very soon fall off). ORD. *Leguminosæ.* A monotypic genus, the species being a very handsome, hardy or nearly hardy, evergreen shrub. It thrives best

Piptanthus—*continued.*

in a rich sandy loam, and in exposed parts should have the protection of a wall. Propagated by seeds; by cuttings of the ripened shoots, inserted under a hand light; and by layers.

P. nepalensis (Nepaulese).* Evergreen Laburnum. *fl.* yellow, large, in terminal, bracteate racemes; standard orbicular, slightly exceeding the wings, the sides reflexed; wings oblong-obovate; keel as long as, or longer than, the wings, scarcely incurved; petals connate at the base. Spring. *l.* alternate, petiolate, digitately trifoliolate; leaflets lanceolate, acute, slightly hairy; stipules united in one, opposite the leaves. *h.* 10ft. Temperate Himalaya, 1821. (S. B. F. G. 264; H. E. F 131, under name of *Baptisia nepalensis.*)

PIPTOCLAINA. Included under *Heliotropium.*

PIPTOSPATHA (from *pipto*, to fall, and *spathe*, a spathe; after fertilisation, the top of the spathe falls off like an extinguisher). ORD. *Aroideæ* (*Araceæ*). A monotypic genus. The species is a stove, herbaceous, tufted, stemless perennial, of little other than botanical interest. It thrives best in a well-drained compost of rich, sandy loam, fibry peat, and leaf mould. A very moist atmosphere is essential. Propagated by divisions, or by seeds.

P. insignis (remarkable). *fl.* white, tinted with pink, 1½in. long, convolute, ovate-fusiform; spadix half as long as the spathe, sessile; peduncles longer than the petioles, slender, decurved at apex. Summer. *l.* numerous, nearly 6in. long, lanceolate, coriaceous, cartilaginously margined, slightly dotted beneath; petioles much shorter than the leaves, sheathing at base. Borneo, 1879. (B. M. 6598; G. C. n. s., xi., p. 139.)

PIQUERIA (named after A. Piqueria, a Spanish botanist, who published a translation of Hippocrates in 1757). Including *Phalacræa.* ORD. *Compositæ.* A genus comprising about half-a-score species of greenhouse or hardy shrubs, or rarely erect annual or perennial herbs, natives of mostly Western South America, from Bolivia to Mexico. Flower-heads white or bluish, small, homogamous, often densely cymose, the cymes corymbose or loosely paniculate; involucre campanulate; receptacle flat or convex, naked. Leaves opposite, toothed or entire. The only species known to cultivation are the two described below. Both are hardy, and of easy culture in ordinary garden soil. *P. latifolia* may be increased by seeds, and *P. trinervia* by division.

P. latifolia (broad-leaved). *fl.-heads* purplish, pedicellate; peduncles almost naked, corymbose at apex. July. *l.* petiolate broadly ovate, truncate at base. *h.* 1½ft. Peru, 1800. Annual. (R. G. 107.) SYNS. *Ageratum latifolium*, *Phalacræa cœlestina.*

P. trinervia (three-nerved). *fl.-heads* white, disposed in loose, corymbose, many-headed panicles. July. *l.* ovate or oblong-lanceolate, sub-serrate, trinerved. *h.* 2ft. Mexico, 1798. Glabrous perennial herb. (B. M. 2650.)

PIRIGARA. A synonym of **Gustavia** (which *see*).

PIRIQUETA. Included under **Turnera** (which *see*).

PIRONNEAUA. Included under *Æchmea.*

PISAURA. A synonym of **Lopezia** (which *see*).

PISCIDIA (from *piscis*, a fish, and *cædo*, to kill or destroy; the leaves, bark, and twigs, are bruised, and thrown into ponds or rivulets, for the purpose of intoxicating fish, by which means they are easily taken). Fish Poison-tree; Jamaica Dogwood. ORD. *Leguminosæ.* A monotypic genus, the species being a stove, evergreen tree, having the flowers, foliage, and habit, of *Lonchocarpus*, but the pod bears four projecting, longitudinal wings. The species requires a compost of sandy, fibry loam. Cuttings of half-ripened shoots will root in sand, under a glass, in heat.

P. erythrina (red). *fl.* white and mixed with blood-colour, above ½in. long, appearing before the leaves; calyx teeth broadly triangular; standard silky-hoary outside, the claw almost equalling the calyx; panicles lateral, sometimes ovate and dense-flowered, scarcely 3in. long, sometimes elongate-thyrsoid, 6in. to 12in. long. May. *l.* alternate, pinnate, exstipellate; leaflets seven to eleven, oval, obovate, or broadly oblong, obtuse or shortly acuminate, at length coriaceous, 2in. to 4in. long, on stalks ¼in. long. *h.* 30ft. West Indies, 1690.

PISIFORM. Resembling a Pea in shape.

PISONIA (named in honour of Willem Piso, of Amsterdam, an eminent physician and writer on natural history, who died in 1648). SYNS. *Calpidia*, *Ceodes*, *Columella*, *Pallavia*, and *Torrubia*. ORD. *Nyctagineæ*. A genus consisting of about sixty species of unarmed or rarely spiny, glabrous or pubescent, erect or rarely sub-scandent, stove or greenhouse trees and shrubs, mostly natives of tropical America; a few are found in Asia and the Pacific Islands, and six in the Mascarene Islands. Flowers pink, greenish, or yellow, small, disposed in paniculate, sub-sessile, or pedunculate cymes, two or three-bracteolate; male perianth tubular- or infundibular-campanulate, female large and oblong; limb of five short teeth or lobes. Fruit a small or rather large, elongated utricle. Leaves opposite or scattered, sessile or petiolate, oblong, ovate, or lanceolate, entire. A few of the species are known to cultivation, but they have very little to recommend them to gardeners. Those described below thrive in well-drained loam. Propagation may be easily effected by cuttings, inserted in similar soil.

P. aculeata (prickly). West Indian Cockspur. *fl.* greenish, in small, dense cymes or globular clusters. March. *fr.* in loose cymes, often forming large panicles. *l.* opposite or here and there alternate, petiolate, ovate, often broad, or rarely oblong or lanceolate, obtuse, entire, rarely exceeding 3in., and often less than 2in. long. *h.* 10ft. Tropics, 1806. A tall, woody, greenhouse climbing shrub, often armed with stout, recurved, axillary prickles.

P. grandis (grand). A synonym of *P. inermis*.

P. inermis (unarmed). *fl.* greenish, collected in small cymes, forming a terminal, rather corymbose panicle, usually shortly pedunculate. March. *l.* petiolate, ovate or oblong, acuminate or almost obtuse, rounded or narrowed at base, often 6in. to 8in. long. *h.* 10ft. Australia, 1806. A small, greenhouse tree. SYN. *P. grandis*.

P. obtusata (obtuse). *fl.* greenish, shortly pedicellate; cymes stalked, terminal. April. *l.* obovate or obovate-oblong, rounded at the tip, and tapering towards the petiole, glabrous or pubescent. *h.* 4ft. West Indies, 1824. Stove shrub.

PISSODES. A small genus of beetles, included under the large group of Weevils (*Curculionidæ*). The species are few, and are much alike in size and appearance. All feed, both as larvæ and as perfect insects, on coniferous trees. An account of their ravages is given under the heading of **Pine Weevils.**

PISTACHIO OR PISTACIA NUT-TREE. *See* **Pistacia vera.**

PISTACIA (from *Pistake*, the old Greek name, used by Theophrastus, and that from the Persian *Pista*). SYN. *Terebinthus*. ORD. *Anacardiaceæ*. A genus comprising half-a-dozen species of hardy, small-growing trees, five of which are natives of the Mediterranean region, from Western Asia to the Canary Islands, and the sixth Mexican. Flowers small, apetalous, dicœcious, disposed in axillary panicles or racemes; pedicels bracteate at base. Fruit a one-seeded, dry drupe. Leaves alternate, perennial or deciduous, trifoliolate or pari- or impari-pinnate. *P. Lentiscus*, *P. Terebinthus*, and *P. vera*, are trees of great economic value. The species in cultivation thrive best in a rich, deep, sandy loam, and against a wall. Propagated by layers, or by cuttings.

P. atlantica (Atlantic). *fl.* in loose, panicled racemes; anthers deep red. *l.* impari-pinnate; leaflets usually nine, tapering to the base. *h.* 40ft. Canaries, 1790. Evergreen.

P. Lentiscus (Lentiscus). Mastich-tree. *fl.* green, on loose racemes, which issue from the sides of the branches. Spring. *l.* abruptly pinnate; leaflets eight, lanceolate; petioles winged. *h.* 20ft. South Europe, 1664. Evergreen. This plant yields the drug known as "mastich." (B. M. Pl. 63.) The variety *angustifolia* has almost linear leaflets; whereas in the form known as *Chia* they are ovate.

P. Terebinthus (Terebinthus). Turpentine-tree. *fl.* greenish, disposed in large, compound panicles; anthers dull yellow; stigmas crimson. June. *l.*, leaflets usually numerous, ovate-lanceolate, rounded at the base, acute and mucronate at the apex. *h.* 30ft. South Europe, 1656. Deciduous. The red hue of the young leaves of this species is very beautiful. The resin, the Chian or Cyprus turpentine, is obtained from this tree, the liquid flowing from incisions made in the trunk. (B. M. Pl. 69.)

Pistacia—*continued.*

P. vera (true). Pistachio Nut-tree. *fl.* brownish-green. April. *fr.* panicled, about 1in. long, ovate, with an oblique point, reddish. *l.* pinnate; leaflets ovate, tapering a little to the base, rather mucronate at the apex. *h.* 20ft. Syria, 1770. Deciduous.

PISTIA (probably from *pistos*, watery; in reference to the habitat). SYNS. *Apiospermum*, *Limnonesis*, *Zara*. ORD. *Aroideæ* (*Araceæ*). A monotypic genus. The species is an ornamental, stove aquatic, requiring plenty of heat. It increases rapidly, and often completely coats tropical ponds and water-tanks with verdure, keeping the water beneath fresh and cool. The plant floats on the water, and sends down many long, feathery roots. Each plant sends out several runners, and upon the ends of these other similar plants are formed, which again send out runners.

P. Stratiotes (Stratiotes).* Tropical Dockweed; Water Lettuce. *fl.* greenish, very small, borne in little spathes at the end of the leaves, each spathe containing one male and one female flower attached to an adnate spadix. *l.* wedge-shaped, slightly concave, notched or round topped, 2in. to 5in. long, of a delicate pale pea-green, covered with fine hairs. Tropics, 1843. (B. M. 4564; F. d. S. 625; L. J. F. 137.)

PISTIL. The female organ in flowers; it consists of ovary, style, stigma, and ovules, or at least of ovary and stigma.

PISTORINIA. Included under **Cotyledon** (which *see*).

PISUM (the old Latin name, used by Virgil, akin to the Greek *Pison*). Pea. ORD. *Leguminosæ*. A genus comprising only a couple of species of diffuse or climbing, hardy, annual herbs, one of which is much cultivated, and is here and there naturalised, in the Mediterranean region and in Western Asia, and the other is a native of the Taurian Mountains. Flowers purple, rose, or white, showy; peduncles axillary, elongated, solitary or a few racemose; calyx lobes sub-equal, or the two upper ones broader; standard broadly obovate or sub-orbicular; wings falcate-oblong, longer than the keel. Pods compressed, obliquely acute, bivalved. Leaves pinnate; common petiole terminating in a bristle or tendril; leaflets one to three-jugate. *P. elatius* requires similar treatment to **Lathyrus** (which *see*). For culture, &c., of *P. sativum*, *see* **Pea.**

P. elatius (tall). *fl.* pale red, with the lamina of the wings dark purple; peduncles two-flowered, erect, longer than the leaves. June to September. *l.*, petioles terete, bearing six lanceolate-oblong leaflets; stipules rounded and crenated below. Stems erect. Iberia, 1820. Climber.

P. sativum (cultivated). *fl.* white or red; peduncles two or many-flowered. June to September. *l.*, petioles terete, bearing three pairs of ovate, entire, glaucous leaflets, with undulated margins, usually opposite and mucronulate; stipules ovate, somewhat cordate, crenated at the base. South Europe. A climber, of which there are several varieties, including *arvense*, *humile* (Dwarf Pea), *macrocarpum*, *quadratum*, *saccharatum* (Sugar Pea), and *umbellatum* (Crown Pea).

PITCAIRNIA (named after W. Pitcairn, a physician, of London). SYN. *Hepetis*. Including *Neumannia* and *Pepinia*. ORD. *Bromeliaceæ*. A genus comprising about seventy species of stove perennial herbs, rarely shrubs, generally stemless, with the leaves in a dense rosette; they are all natives of tropical America. Flowers red, yellow, or whitish; calyx with a short, obconical tube, adnate to the base of the ovary, and three large, lanceolate segments; corolla of three lingulate, unguiculate petals, one and a-half to three times the length of the sepals, usually with two minute scales at the base; stamens six; peduncle leafy, the proper leaves passing gradually into bracts; inflorescence generally a simple or panicled raceme, rarely a head or sub-spicate raceme. Leaves linear or ensiform, rarely oblong, lepidote on the back, or green and naked on both surfaces, often prickle-margined, especially towards the base, sessile or narrowed into a channelled petiole. All the species described below are herbaceous perennials, except where otherwise stated. For culture, *see* **Æchmea** and **Billbergia.** The following enumeration of species is based on Mr.

Pitcairnia—*continued.*

Baker's synopsis of the genus, which appeared in "Trimen's Journal of Botany," 1881.

P. albiflos (white-flowered). *fl.* in a simple, loose raceme, 6in. to 12in. long; petals white, three times as long as the sepals; peduncle 1ft. to 2ft. long. September. *l.* many to a tuft, linear, 1½ft. to 2ft. long, ½in. to ¾in. broad at the middle, obscurely petioled, without prickles. Rio Janeiro, 1826. (B. M. 2642.) SYN. *P. odorata* (R. G. 1855, 114).

P. alta (tall). *fl.*, sepals and petals bright red, the latter 2in. long, ¼in. broad; racemes several, arranged in a deltoid panicle, 2ft. long and broad; peduncle 2ft. to 3ft. long, floccose. August. *l.* twelve to twenty to a stem, linear, 2ft. to 3ft. long, ¾in. to 1in. broad above the middle, spine-edged towards the base. Dominica, before 1877. (B. M. 6606.) This species is known in gardens by the following names: *P. bromeliæfolia*, *P. intermedia*, and *P. Skinneri*.

P. Altensteinii (Altenstein's). *fl.* in a simple, sub-spicate raceme, 4in. to 6in. long; sepals 1in. to 1¼in. long; petals whitish, twice as long as the sepals; bracts bright red, 1½in. to 2in. long; peduncle 1ft. to 1½ft. long. May. *l.*, produced ones about ten to a stem, 2ft. to 3ft. long, 1½in. to 2in. broad, with an unarmed or minutely prickly petiole. Western Venezuela, 1840. (F. d. S. 162.) SYNS. *P. undulatifolia* (B. M. 4241), *Puya Altensteinii*.

P. A. gigantea (gigantic). A very large form, with an inflorescence 6ft. to 7ft. high, including the peduncle. (B. M. 4309; F. d. S. 253, 254.)

FIG. 190. PITCAIRNIA ANDREANA, showing Habit, detached Flower, and Portion of Leaf to show the Scales.

P. Andreana (André's).* *fl.* in a simple raceme, 4in. to 6in. long; petals yellow at the tip, red lower down, four times as long as the sepals; peduncle 4in. to 6in. long, densely leafy. July. *l.*, produced ones four or five to a stem, lanceolate, not distinctly petioled, 16in. to 20in. long, 1in. to 1½in. broad, white beneath, lepidoted above. New Grenada and Venezuela, 1872. See Fig. 190. (B. M. 6480; I. H. n. s. 139.) SYN. *P. lepidota*.

P. angustifolia (narrow-leaved). *fl.* in one to three racemes, the end one 6in. to 9in. long; petals 1½in. to 1¾in. long, bright red, scaled at base; peduncle, including inflorescence, 2ft. to 3ft. long. September. *l.* linear, about 2ft. long, ¼in. to ½in. broad, acuminate, not petioled, white-furfuraceous at back, armed down the margins with brown, horny spines. Santa Cruz, 1777. (B. M. 1547.)

P. aphelandræflora (Aphelandra-flowered).* *fl.* in a dense, oblong, sub-spicate raceme, 4in. to 6in. long; sepals coral-red, ½in. long; petals bright red, 2½in. long; lower bracts 2in. to 3in. long. Summer. *l.* thirty to sixty, extending over 3in. to 6in. of the stem, linear, sessile, about 6in. long, less than ½in. broad, minutely serrulate. Stems slender, 1ft. long below the leaves. Para, 1867. Shrub. SYN. *Pepinia aphelandræflora* (I. H. n. s., xxxii. 5).

P. atrorubens (dark reddish). *fl.* in a simple, sub-spicate raceme, 6in. to 8in. long; petals pale yellow, lingulate, 2½in. to 3in. long; bracts bright red, much imbricated; peduncle leafy, shorter than the leaves. Summer. *l.*, produced ones with a spine-edged petiole, 3in. to 6in. long, and a lanceolate blade, 2ft. to 3ft. long and 2in. to 3in. broad. Central America. SYN. *Puya Warcewiczii* (B. M. 5225).

P. bracteata (large-bracted). *fl.* in a simple, dense raceme, 6in. to 12in. long; sepals nearly 1in. long; petals bright red, decurving, twice as long as the sepals; bracts 1in. to 1½in. long; peduncle nearly 1ft. long, with numerous reduced leaves. April. *l.* in a dense tuft, linear, 1½ft. to 2ft. long, 1in. broad, acuminate, entire or slightly prickly towards the base. St. Vincent, 1799. (B. M. 2813.) SYN. *P. communtata* (R. G. 1867, 557). *P. sulphurea* (A. B. R. 249) is regarded, by Mr. Baker, as a yellow-flowered variety of this species.

Pitcairnia—*continued.*

P. bromeliæfolia (Bromelia-leaved). *fl.* in simple or slightly compound racemes, 1ft. long; sepals and petals bright red, the latter 2in. long; peduncle about 1ft. long below the inflorescence, with several long leaves. June. *l.* in a dense tuft, linear, 2ft. to 3ft. long, ½in. to ¾in. broad at the middle, acuminate, spine-edged towards the base, white-furfuraceous beneath. Jamaica, 1781. (B. M. 824; B. R. 1011.) *P. platyphylla* is regarded, by Mr. Baker, as a robust, broad-leaved variety of this species.

P. bromeliæfolia (Bromelia-leaved), of L'Héritier. A synonym of *P. alta*.

P. cinnabarina (cinnabar-red). *fl.* in dense, simple racemes, about 6in. long; sepals ¾in. long; petals bright red, 2in. long; peduncle 1ft. long, with several reduced leaves. June. *l.*, produced ones linear, sessile, 1½ft. long, scarcely ¾in. broad, quite without spines near the base. Brazil, 1851.

P. commutata (changeable). A synonym of *P. bracteata*.

P. corallina (coral-red).* *fl.* in dense, deflected racemes, above 1ft. long; sepals bright red, 1in. long; petals bright red, edged with white, 3in. long; peduncle also bright red, 1ft. long. Spring. *l.*, produced ones lanceolate, distinctly petioled, 4ft. to 5ft. long, about 4in. broad, spine-edged low down, plicate, white-furfuraceous at back. Choco, New Grenada, about 1874. (B. M. 6600; R. H. 1875, p. 251.)

P. corcovadensis (Corcovado). *fl.* red, disposed in a single, loose, terminal raceme, on a stem about 1ft. high. *l.* erect, glabrous, broadly linear, acuminate, 3ft. to 4ft. long, passing into linear bracts on the flower-stem. *h.* 1ft. Brazil, 1884. A slender species.

P. Decaisnei (Decaisne's). A synonym of *P. fulgens*.

P. densiflora (dense-flowered). *fl.* in a very dense, sub-spicate, oblong raceme, 3in. to 4in. long; petals bright yellowish-red, twice as long as the pale green sepals. Summer. *l.*, produced ones with an unarmed, channelled petiole, 6in. long, and an ensiform, entire blade, 2ft. to 3ft. long, and about 1½in. broad. Native place unknown.

P. echinata (prickly). *fl.* in several loose racemes, arranged in a deltoid panicle; petals whitish, nearly twice as long as the sepals; peduncle 2ft. to 4ft. long below the inflorescence, with eight to ten leaves, the lower 1ft. long. June. *l.*, produced ones twelve to twenty to a stem, lanceolate, 3ft. to 4ft. long, 1in. to 2in. broad, obscurely petioled, white-furfuraceous at back, prickle-margined. *h.* 5ft. to 6ft. New Grenada, 1852. (B. M. 4709; F. d. S. 844; L. J. F. 407.)

P. exscapa (stemless). A synonym of *P. heterophylla*.

P. ferruginea (rusty). *fl.* in ten to twelve secund racemes, arranged in a deltoid panicle, the lower branches of which are 2ft. to 3ft. long; sepals densely ferruginous externally, 2in. to 2½in. long; petals white, twice as long as the sepals, with two large scales at the base; peduncle 2ft. to 3ft. long below the inflorescence. December. *l.* perhaps 100, in a very dense rosette, sessile, 2ft. to 3ft. long, 1½in. to 2in. broad, horny in texture, densely white-lepidote at back. Stem 3ft. to 4ft. long below the rosette of leaves. *h.* 10ft. to 12ft. Andes of Peru, 1860. The largest species of the genus. SYN. *Puya grandiflora* (B. M. 5234).

P. flammea (flame-coloured). *fl.* in a rather dense raceme, 6in. to 12in. long; sepals red, ¾in. long; petals bright red, more than twice as long as the sepals; peduncle also bright red, 1ft. to 1½ft. long, copiously leafy. November. *l.*, produced ones ensiform, 2ft. to 2½ft. long, 1in. to 1¼in. broad, not distinctly petioled, acuminate, persistently white-furfuraceous at back, not at all spiny. Organ Mountains, 1825. (B. R. 1092.)

P. flavescens (yellowish). A synonym of *P. xanthocalyx*.

P. fulgens (brilliant).* *fl.* in several very loose racemes, 3in. to 6in. long, forming a deltoid panicle; sepals and petals bright red, the latter 2in. to 2¼in. long, with a large, truncate scale at the base; peduncle 3ft. long below the inflorescence, copiously leafy. May. *l.*, produced ones twenty to a tuft, ensiform, 2ft. to 3ft. long, 1in. to 1½in. broad, white at back, prickle-margined. Brazil, 1850. A fine plant, well known in cultivation. SYN. *P. Decaisnei*.

P. fulgens (brilliant). A garden synonym of *P. Karwinskiana*.

P. Funkiana (Funk's). *fl.* in a sub-spicate raceme, 6in. to 12in. long; sepals 1in. long; petals nearly white, over 2in. long; bracts yellowish-green, 1in. to 1¼in. long; peduncle 2ft. long, slightly pubescent, its lower leaves large. May. *l.* lanceolate, entire, 2ft. to 3ft. long, 2in. to 2½in. broad, glabrous; petiole unarmed, 6in. to 12in. long. Venezuela, 1850. (R. G. 113.) SYN. *P. macrocalyx* (B. M. 4705).

P. furfuracea (scurfy). *fl.* in three to five rather dense racemes, the end one about 1ft. long; petals bright red, 2in to 2½in. long, scaled at base; peduncle, including the inflorescence, 2ft. to 3ft. long. July. *l.* linear, about 2ft. long and 1in. broad, acuminate, not distinctly petioled, white-furfuraceous at back, spiny towards the base. Native country unknown. Mr. Baker regards this as "doubtfully distinct, specifically, from *P. latifolia*." (B. M. 2657.)

P. heterophylla (variable-leaved). *fl.* six to twelve in a capitate, sessile or nearly sessile spike; sepals reddish, 1in. to 1¼in. long; petals bright red, rarely white, about 1¾in. long; pedicels very short or wanting. May. *l.*, outer rudimentary ones of the

Pitcairnia—*continued.*

rosette deltoid; produced ones about six, linear, 1ft. to 2ft. long, ¼in. to ½in. broad, not petioled, nor at all toothed. Mexico, &c., 1848. SYNS. *P. exscapa* (B. M. 4591), *P. Morrenii* (L. J. F. 21), *Puya heterophylla* (B. R. xxvi. 71), *Puya longifolia* (L. & P. F. G. 86).

P. imbricata (imbricated). *fl.* in a sub-spicate raceme, 1ft. long; sepals whitish, tipped with green, 1in. long; petals creamy-white, lingulate, more than 2in. long; peduncle 1ft. long, closely leafy. October. *l.* twelve to twenty to a stem, ensiform, 1½ft. to 2ft. long, with a petiole 6in. to 12in. long, armed with small, deflexed, horny, brown prickles. Mexico and Cordova, 1868. Plant caulescent.

P. integrifolia (entire-leaved). *fl.* in one to five very loose racemes, the end one 1ft. long; petals bright red, 1in. longer than the sepals, scaled at base; peduncle more than 1ft. long. August. *l.*, produced ones linear, 2ft. to 3ft. long, about ½in. broad, tapering to a long point, not distinctly petioled, closely white-furfuraceous at back, destitute of teeth. West Indies, about 1810. (B. M. 1462.)

P. intermedia (intermediate). A garden synonym of *P. alta*.

P. iridiflora (Iris-flowered). *fl.* in a raceme 1ft. long; petals bright red, 2in. long, not scaled at base; peduncle about 1ft. long. July. *l.* linear, 2ft. to 3ft. long, ⅛in. broad, much overtopping the raceme, spine-toothed. Native country unknown.

P. Jacksoni (Jackson's). *fl.* in a loose raceme, 8in. to 9in. long; petals bright red, three times as long as the sepals, scaled at base; peduncle over 3ft. long, with many reduced leaves. May. *l.* linear, entire, 2ft. to 3ft. long, ½in. broad, white-furfuraceous at back; petioles channelled, 1ft. long, spine-edged at the dilated base. Guatemala, about 1850. (B. M. 4540.) SYN. *Lamprococcus Jacksoni* (L. J. F. 127).

P. Karwinskiana (Karwinski's).* *fl.* in a dense raceme, about 6in. long; sepals reddish, ⅜in. long; petals bright red, secund, 2½in. long, not scaled; peduncle 1ft. to 2ft. long, with many reduced leaves. June. *l.*, produced ones linear, 1½ft. to 2ft. long, ½in. to ¾in. broad, distinctly petioled, usually without prickles. Mexico. A well-known species. SYN. *P. ringens* (R. G. 53). This species is also known in gardens as *P. fulgens*, *P. montalbensis*, and *P. Warcewicziana*.

P. latifolia (broad-leaved). *fl.* in a simple or slightly compound raceme, 6in. to 9in. long; petals bright red, 2in. long, scaled at base; peduncle 1ft. to 2ft. long, leafy. August. *l.* linear, 2ft. to 3ft. long, nearly 1in. broad, acuminate, not distinctly petioled, white-furfuraceous at back, with only a few prickles. St. Eustace Island, 1785. (A. B. R. 322; B. M. 856.)

P. Lehmanni (Lehmann's). *fl.* in dense, panicled racemes; petals bright red, 1½in. to 1⅝in. long. *l.*, produced ones ensiform, 2ft. to 3ft. long, above 1in. broad, copiously spiny towards the base. Southern New Grenada.

P. lepidota (scaly). A synonym of *P. Andreana*.

P. longifolia (long-leaved). A synonym of *P. pulverulenta*.

P. macrocalyx (large-calyxed). A synonym of *P. Funkiana*.

P. maidifolia (Indian Corn-leaved). *fl.* in a sub-spicate raceme, nearly 1ft. long; sepals 1in. long; petals greenish-white, 2½in. long; peduncle leafy, 1½ft. to 2ft. long. May. *l.* lanceolate, petioled, 2ft. to 3ft. long, 1½in. to 2in. broad, without prickles. Venezuela, 1848. (F. d. S. 915.) SYN. *Puya maidifolia*.

P. montalbensis (Monte Alban). A garden synonym of *P. Karwinskiana*.

P. Moritziana (Moritz's). *fl.* in a loose raceme, 6in. to 12in. long; sepals ¾in. long; petals bright red or reddish-yellow, 2in. to 2½in. long, not scaled; peduncles 6in. to 15in. long, with many erect, reduced leaves. Summer. *l.*, produced ones many to a rosette, linear, 1ft. to 1½ft. long, 1in. broad, not distinctly stalked, mostly without prickles. Guatemala, about 1860.

P. Morrenii (Morren's). A synonym of *P. heterophylla*.

P. muscosa (mossy).* *fl.* in a loose raceme, 3in. to 6in. long; petals bright red, 2in. long, not scaled at base; peduncle 6in. to 9in. long, densely floccose. December. *l.* twelve to twenty in a tuft, linear, 6in. to 9in. long, falcate, very acuminate, white-furfuraceous at back, entire or minutely denticulate. *h.* not more than 1ft. Central Brazil. (B. M. 4770.)

P. nubigena (cloud-born). *fl.* in a somewhat dense raceme, 6in. to 8in. long; sepals red, 1in. to 1¼in. long; petals bright red, scaled at base, more than twice as long as the sepals; peduncle leafy, 1ft. to 1½ft. long. October. *l.*, produced ones ensiform, petioled, 1in. broad, narrowed to both ends, entire. Venezuela (at 8000ft. to 9000ft. altitude), 1852. Plant tufted. (F. d. S. 847.)

P. odorata (odorous). A synonym of *P. albiflos*.

P. platyphylla (broad-leaved). A variety of *P. bromeliæfolia*.

P. pulverulenta (powdery). *fl.* in many racemes, arranged in a deltoid panicle; petals bright red, about 2in. long, scaled at base; peduncle elongated, with several leaves. December. *l.*, produced ones ensiform, 3ft. to 4ft. long, 1½in. to 2in. broad, narrowed at both ends, spine-margined towards the base, white-furfuraceous beneath. *h.* 6ft. to 12ft. Andes of Peru, 1852. SYN. *P. longifolia* (B. M. 4775).

Pitcairnia—*continued.*

P. pungens (stinging).* *fl.* in a dense raceme, 4in. to 8in. long; sepals rather cottony; petals bright red, scarlet at base, 2in. long; peduncle 6in. to 12in. long, cottony, its many leaves bract-like, the lower sometimes pectinate. May. *l.*, produced ones six to eight, linear, 1ft. to 1½ft. long, scarcely ½in. broad, loosely furfuraceous on the back, destitute of prickles; outer rudimentary ones furnished with a long, rigid, pectinate tip. Andes, 1863. (B. M. 5356.)

P. punicea (reddish). *fl.* in a loose raceme, 4in. to 6in. long; sepals about ½in. long; petals bright red, 1½in. to 1⅝in. long; peduncle very short. Summer. *l.*, proper ones twenty to thirty, spread over 3in. to 4in. of the stem, linear, not distinctly petioled, about 1ft. long, less than ½in. broad, white-furfuraceous at back. *h.* about 1ft. Mexico. Plant caulescent.

P. recurvata (recurved). *fl.* in a dense, sub-spicate raceme, 4in. to 6in. long; sepals nearly 1in. long; petals milk-white, 3in. to 3½in. long, much decurved, minutely scaled at base; peduncle 1½ft. to 2ft. long, furfuraceous, with bract-like leaves. April. *l.*, produced ones ten to twelve to a stem, lanceolate, 2ft. long, 1in. to 1⅛in. broad, minutely serrulated towards the tip, white-furfuraceous beneath. Native place unknown, 1843.

P. ringens (gaping). A synonym of *P. Karwinskiana*.

P. Skinneri (Skinner's). A garden synonym of *P. alta*.

P. speciosissima (very showy). A garden synonym of *P. undulata*.

P. staminea (long-stamened). *fl.* in a long, loose raceme, 1ft. to 1½ft. long; petals bright red, 2in. long, very narrow, revolute at the apex, scaled at base; peduncle 1ft. to 2ft. long, its lower leaves long, its upper rudimentary. January. *l.*, produced ones ten to twenty to a tuft, linear, 1ft. to 2ft. long, ¼in. to ½in. broad, very acuminate, thinly white-furfuraceous on the back, with a channelled petiole, 6in. or more long, entirely without teeth. Rio Janeiro, about 1820. A well-known species. (B. M. 2411; I. H. n. s. 205; L. B. C. 722.)

P. suaveolens (sweet-scented). *fl.* in a moderately dense raceme, 6in. to 8in. long; sepals about 1in. long; petals whitish, lingulate, 2in. long; peduncle above 1ft. long, with many much-reduced leaves. July. *l.*, produced ones linear, 1½ft. long, ½in. to ⅝in. broad at the middle, acuminate, not petioled, entirely without prickles, glabrous. Organ Mountains, 1826. (B. R. 1069.)

P. sulphurea (sulphur-coloured). A variety of *P. bracteata*.

P. tabulæformis (plank-like).* *fl.* thirty to forty, in a dense head, sessile in the centre of the rosette of leaves; sepals bright red, less than 1in. long; petals the same colour, but 3in. long, scaled at base. *l.*, produced ones twenty to thirty, in a sessile rosette, oblong, spathulate, 5in. to 6in. long, 2in. broad, gradually narrowed to both ends, free from spines. Mexico, 1863. The leaves lie flat on the soil, hence the specific name. (B. H. 1862, p. 257; F. M. 297; I. H. 344.)

P. undulata (wavy). *fl.* in a simple raceme, 1ft. long, lax in the lower half, the rachis bright red; petals also bright red, more than twice as long as the sepals; peduncle 1ft. long, with five or six small, adpressed leaves. July. *l.*, produced ones obovate-oblong, 1ft. or more long, 4in. to 5in. broad, cuneate at base, finely white-furfuraceous at back, with a distinct unarmed petiole, 6in. to 8in. long. Brazil (?), 1843. A fine, well-known species, sometimes known in gardens as *P. speciosissima*. (F. d. S. 162; R. G. 781.)

P. undulatifolia (wavy-leaved). A synonym of *P. Altensteinii*.

P. virescens (greenish). *fl.* in a sub-spicate raceme, 6in. to 8in. long; sepals 1in. to 1¼in. long; petals pale yellowish-green, twice as long as the sepals; peduncle 2ft. long, the leaves graduating into bracts. March. *l.* lanceolate, not petioled, 1½ft. to 2ft. long, 1½in. to 2in. broad, free from prickles. Venezuela, 1857. SYN. *Puya virescens* (B. M. 4991).

P. Warcewicziana (Warcewicz's). A garden synonym of *P. Karwinskiana*.

P. Wendlandi (Wendland's). *fl.* in a sub-spicate raceme, 6in. to 12in. long; sepals 1in. long; petals sulphur-yellow, scaled at base, more than twice as long as the sepals; bracts purplish-red or greenish towards the tip; peduncle closely leafy, 2ft. or more long, stiffly erect. December. *l.*, produced ones entire, ensiform, 2ft. to 3ft. long, 2in. to 3in. broad, with a distinct, unarmed petiole. Native country unknown. About 1853. SYN. *Puya sulphurea* (B. M. 4696).

P. xanthocalyx (yellow-calyxed).* *fl.* in a simple raceme, loose in the lower half, 1ft. to 2ft. long; petals lingulate, primrose-yellow, 2in. long; peduncle 1½ft. to 2ft. long, the lower leaves 6in. to 12in. long. Summer. *l.*, produced ones up to twenty to a stem, lanceolate, 2ft. to 3ft. long, 1in. to 1½in. broad, obscurely petioled, free from prickles, white-furfuraceous at back. Brazil, 1877. *P. flavescens* (B. M. 6318) is regarded, by Mr. Baker, as synonymous with this species.

P. zeifolia (Zea-leaved).* *fl.* in a sub-spicate raceme, 1ft. to 1½ft. long; sepals nearly 1in. long; petals nearly white, more than twice as long as the sepals; bracts reddish-yellow; peduncle 1ft. to 2ft. long, leafy, nearly glabrous. *l.* lanceolate, entire, 2ft. to 3ft. long, 2in. to 2½in. broad, naked, with a channelled petiole, 6in. long. Guatemala. (B. M. 6535.)

PITCHER. A name commonly applied to the tubular petioles of the Sarracenias, and also to the urn-like expansion in *Nepenthes*. Sir Joseph Hooker has shown that, in the latter genus, the Pitcher is not the dilated petiole, but a special organ, represented by a gland at the top of the costa of the young leaf.

PITCHER-PLANT. *See* **Nepenthes** and **Sarracenia.**

PITCH-TREE, BURGUNDY. *See* **Picea excelsa.**

PITH. The central cellular part of a stem; the same as Medulla.

PITHECOCTENIUM (from *pithex, pithecos*, a monkey, and *kteis, ktenos*, a comb; in allusion to the common name). Monkey's Comb. ORD. *Bignoniaceæ*. A genus comprising about a score species of stove, often tomentose-pubescent or lepidoted, sometimes glabrous, climbing shrubs, natives of tropical America, extending from Brazil to Mexico. Flowers white or violet, rather large, disposed in simple, or rarely sub-thyrsoid, branched racemes; calyx broadly tubular-campanulate, truncate or minutely five-toothed; corolla tube cylindrical and enlarged above the base, often incurved; limb sub-bilabiate; lobes five, round, spreading. Leaves opposite, trifoliolate, or with the terminal leaflet changing to a tendril, or deficiently bifoliolate; leaflets entire, petiolulate. Very few species are now grown. For culture, *see* **Bignonia.**

P. Carolinæ (Lady Caroline's). *fl.* snow-white, with the tube tinged with yellow, sweet scented; corolla arcuate, tomentose, with curled segments; panicle terminal, few-flowered. May. *l.* conjugate; leaflets cordate, acuminate, slightly pubescent. *h.* 10ft. Plant slender, glabrous. (B. R. 1844, 54, under name of *Bignonia Carolinæ*.)

PITHECOLOBIUM (from *pithecos*, an ape, and *lobos*, the lobe of the ear; in allusion to the native name, Monkey's Earring). Curl Brush Bean. ORD. *Leguminosæ*. This genus comprises about 100 species of unarmed or prickly-stipuled, stove trees or shrubs, extending over tropical regions, mostly in Asia and America, a few being natives of Africa and Australia. Flowers often white, similar to those of *Inga*; calyx campanulate or tubular; corolla tubular or funnel-shaped; peduncles solitary or sub-fasciculate, axillary or racemose, or fasciculate at the tips of the branches; heads globose, or rarely in oblong or almost cylindrical spikes. Pods compressed or flat, either spirally twisted or much curved, bivalved or rarely indehiscent. Leaves bipinnate; leaflets sometimes small and many-jugate, sometimes large and few-jugate, occasionally tergeminate, bigeminate, or geminate (pinnæ one-jugate, three, two, or one-foliolate); stipules sometimes small or inconspicuous, sometimes persistent, hard or spinescent. Few of the species have been introduced. For culture, *see* **Inga.**

P. pruinosum (frosty). *fl.* white, with long, exserted stamens, and growing in globular umbels from the axils of the upper leaves. *l.*, pinnæ very regularly in one or two pairs, with or without an odd one; petiole and each rachis varying from 1in. to 6in. long; leaflets usually three or four pairs on the terminal pinnæ, very irregular in number, size, and shape. Queensland and New South Wales, 1869. A beautiful tree, having the young branches, foliage, and inflorescence, covered with a rusty pubescence.

PITS. These are valuable and well-known garden structures, utilised in their simplest form for protecting plants from the injurious effects of rain and severe frost. When heated, they are eligible for plant culture generally, for Cucumber, Melon, and Pine-growing, and for propagating. Pits are distinguished from frames by their walls being built partly beneath the ground, which consequently renders them fixtures, whereas frames are

Pits—*continued.*

movable; generally, all the sashes are movable in both cases. Pits do not afford similar facilities for attending to the occupants as do houses, which the cultivator can enter in all weathers; yet they are indispensable where large, or even small, quantities of young plants

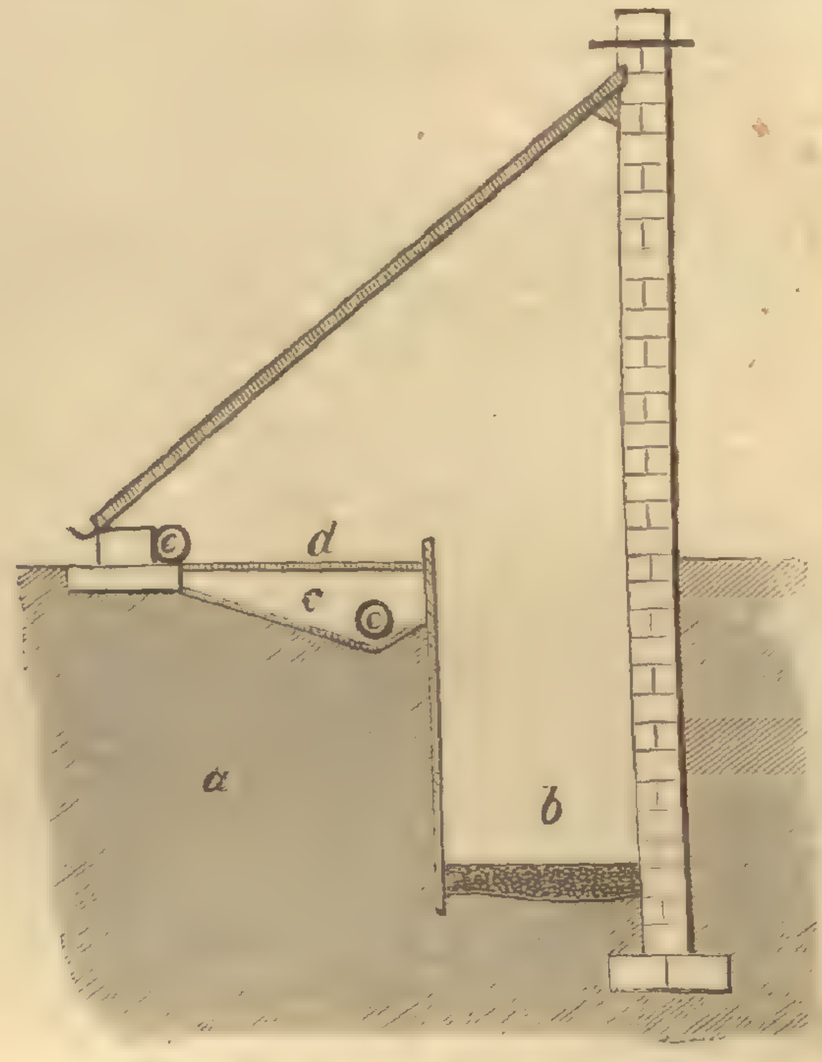

FIG. 191. SECTION OF LEAN-TO PIT.

a, Ordinary Soil; *b*, Passage; *c*, Heated Chamber below Stage; *d*, Bed; *e*, *e*, Hot-water Pipes.

have to be raised and grown on. For bedding plants, a single hot-water pipe is usually sufficient, in a low, narrow Pit, for expelling damp and keeping out frost, except in very severe or unfavourable weather, when cover-

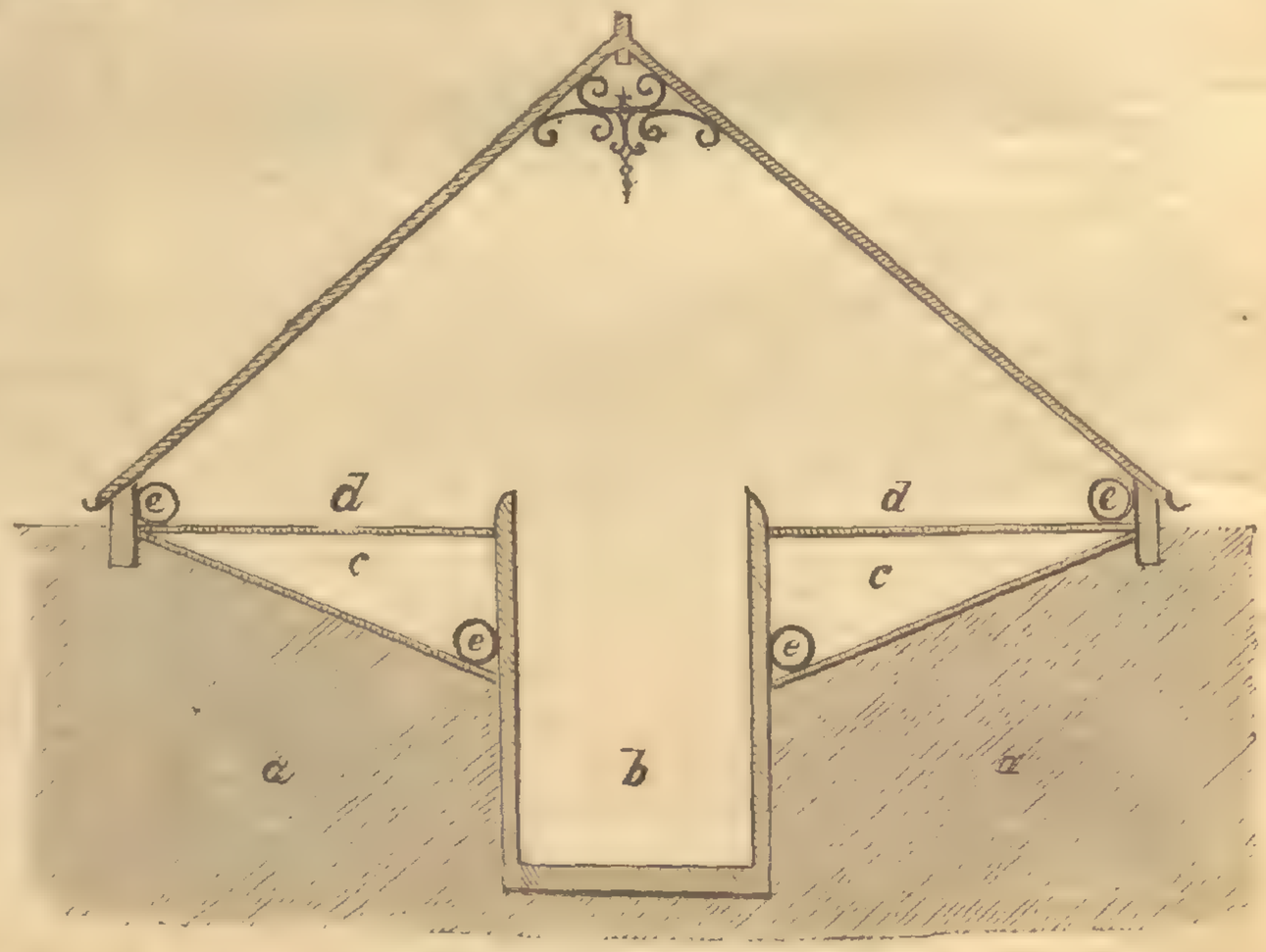

FIG. 192. SECTION OF SPAN-ROOFED PIT.

a, *a*, Ordinary Soil; *b*, Passage; *c*, *c*, Heated Chambers; *d*, *d*, Plunging Beds; *e*, *e*, *e*, *e*, Hot-water Pipes.

ings would be necessary. For Cucumber, Melon, or Pine Pits, a more substantial and much higher structure, and also a greater heating power, are necessary. Fig. 191 represents a useful little Pit for early forcing of Melons or Cucumbers. A narrow, sunken passage, entered from one end, affords sufficient space for attending to the plants; and if a shelter were fixed to the back wall for

Pits—*continued.*

early forced Strawberries, these might possibly be watered from the outside, by opening the sashes a little. Special propagating Pits are best built rather low, in order that they may not be too much exposed to cold winds, and that cuttings, when inserted, may be near the light. To this end, the floor for these is also often sunk into the ground; a path passes through the centre, with a door at the end, and a heated plunging-bed is provided on one or both of the sides (see Fig. 192). If the top sashes are fixed, instead of being movable, then a structure of this sort is more correctly termed a house. Although wood is sometimes used, nothing surpasses ordinary bricks for constructing a framework on which to rest the rafters and sashes. Bricks keep out frost better than wood, and are also much more substantial. Pits are sometimes built with hollowed walls—that is, a double set of bricks is arranged so as to leave a hollow space between; the idea being that of retaining heat, which passes more readily through a solid wall than where there is a chamber midway containing air.

PITTED. Having numerous small, shallow depressions or excavations.

PITTOSPOREÆ. A small order of glabrous, or rarely tomentose or pilose, arborescent or erect shrubs, or twining or flexuous-procumbent under-shrubs, dispersed over the warmer regions of the globe, but mostly found in Australia. Flowers white, blue, yellow, or rarely reddish, hermaphrodite, regular or slightly oblique, sometimes borne on terminal, solitary and nodding, or corymbose or paniculate peduncles, occasionally axillary and solitary or fasciculate; sepals five, distinct, imbricated, or rarely connate at base; petals five, hypogynous, imbricated, longer than the sepals; claw connivent or sometimes coherent; stamens five, hypogynous, free, alternating with the petals, the filaments filiform, or dilated in the middle or at the base. Fruit a capsule or berry. Leaves alternate, entire, toothed, or very rarely slightly cut; stipules none. The species contain resinous, aromatic, and bitter principles, which impart a disagreeable flavour to the fruit. Nine genera and about ninety species are included in the order. Examples are: *Billardiera*, *Marianthus*, *Pittosporum*, and *Sollya*.

PITTOSPORUM (from *pitta*, pitch, tar, and *sporos*, seed; in allusion to the resinous coating of the seeds). ORD. *Pittosporeæ.* A rather large genus (fifty species have been described) of greenhouse or half-hardy, glabrous or tomentose, erect shrubs or small trees, occurring in Africa, the warmer parts of Asia, the Pacific Islands, Australia, or New Zealand. Flowers sometimes in terminal clusters, corymbose, sub-umbellate or paniculate, sometimes solitary or few, terminal, axillary, or lateral; sepals distinct or connate at base; petals connivent or cohering at base, or rarely spreading. Leaves entire, sinuate-dentate, in some species often sub-verticillate at the apices of the branches. All the species form very handsome subjects, and are well adapted for growing in conservatories. The half-hardy ones thrive in any common garden soil, but, except in the south-western counties, &c., require the shelter of a wall. The greenhouse ones succeed in a well-drained, fibry loam. *P. Tobira* is a favourite plant in the Paris flower-markets, and is largely grown for its very fragrant blossoms. All are readily propagated by means of cuttings of the half-ripened wood, inserted in sandy soil, under a bell glass, in a greenhouse, and kept shaded until roots are formed.

P. coriaceum (leathery-leaved). *fl.* bluish-white; peduncles umbellately branched, many-flowered, and, as well as the calyces, villous. May. *l.* obovate, obtuse, coriaceous, quite smooth. *h.* 8ft. Madeira, 1783. Greenhouse shrub. (A. B. R. 151; L. B. C. 569.)

Pittosporum—*continued.*

P. cornifolium (Cornus-leaved). *fl.* dingy-red, polygamous, on very slender, terminal, one or two-flowered peduncles; sepals very narrow, subulate; petals as narrow, with slender tips. May. *l.* whorled, obovate or elliptic-lanceolate, shortly petioled, quite entire and glabrous, coriaceous. Branches forked or whorled. *h.* 2ft. to 4ft. New Zealand, before 1832. A small, slender, half-hardy shrub. (B. M. 3161.)

P. crassifolium (thick-leaved).* Parchment-bark. *fl.* dark chocolate-purple, freely produced in nodding, pedunculate umbels. April. *l.* alternate, narrow-obovate, linear-obovate, or oblong, obtuse, quite entire, light green, tomentose on the under surface. *h.* 4ft. to 10ft. New Zealand, 1872. A bushy-growing, half-hardy shrub, of erect branching habit. (B. M. 5978.)

P. elegans (elegant). A synonym of *P. eugenioides.*

P. eugenioides (Eugenia-like). *fl.* greenish-white, more or less dicecious, fragrant; sepals very variable, ovate, acuminate, glabrous; petals narrow and spreading, recurved. *l.* usually elliptical, acute, narrowed into long petioles, rarely broader and obovate, quite entire, undulated or crisped, rather coriaceous, with numerous fine veins. *h.* 20ft. to 30ft. New Zealand. Greenhouse tree. SYNS. *P. elegans*, *P. microcarpum.*

FIG. 193. PITTOSPORUM TOBIRA, showing Habit and detached Flowering Twig and Flower.

P. ferrugineum (rusty). *fl.* yellow, small; peduncles terminal, usually clustered several together above the last leaves. April to July. *l.* from obovate or ovate, and obtuse or scarcely acuminate, to oblong or almost lanceolate, acuminate, and 3in. to 4in. long, quite entire, narrowed into a petiole, rusty-tomentose on both sides when very young. *h.* 6ft., sometimes attaining 50ft. to 60ft. Australia, 1787. Greenhouse tree. (B. M. 2075.)

P. microcarpum (small-fruited). A synonym of *P. eugenioides.*

P. revolutum (revolute). *fl.* yellow; peduncles terminal, few or solitary, usually decurved, bearing sometimes a single, rather large flower, but more frequently a dense, ovoid or corymbose raceme. February to April. *l.* ovate-elliptical, or elliptical-oblong, shortly acuminate, 2in. to 4in. long, scarcely undulate, narrowed into a petiole. *h.* 4ft. to 6ft. Australia, 1795. Greenhouse shrub. (B. R. 186; S. F. A. 25, under name of *P. fulvum.*

P. sinense (Chinese). A synonym of *P. viridiflorum.*

FIG. 194. FLOWERING BRANCHLET OF PITTOSPORUM VIRIDIFLORUM.

Pittosporum—*continued.*

P. Tobira (its native name).* *fl.* white, fragrant; peduncles one-flowered, pubescent, disposed in aggregate umbels. March to August. *l.* obovate, obtuse, coriaceous, smooth. *h.* 12ft. Japan, 1804. Half-hardy shrub. See Fig. 193. (B. M. 1396.)

P. undulatum (wavy-leaved).* *fl.* white; peduncles terminal, aggregate, pubescent, branched, many-flowered. February to June. *l.* oval-lanceolate, undulated, tapering at both ends, glabrous. *h.* 10ft. Australia, 1789. Half-hardy shrub. (A. B. R. 383; B. R. 16.)

P. viridiflorum (green-flowered).* *fl.* greenish-yellow, Jasmine-scented; panicle somewhat globose, terminal, glabrous. May. *l.* obovate, retuse, cuneate at the base, shining, under surface reticulated. *h.* 6ft. Cape of Good Hope, 1806. Greenhouse shrub. See Fig. 194. (B. M. 1684.) SYN. *P. sinense.*

PLACEA (said to be derived from the native name in Chili). ORD. *Amaryllideæ.* A genus comprising (according to Mr. Baker) about five species of greenhouse, bulbous plants, natives of Chili, and closely related to *Hippeastrum*, from which they differ in having a perfect evolute corona. Flowers many in an umbel, pedicellate; perianth somewhat funnel-shaped, slightly declinate, with an exceedingly short tube. Leaves linear, carinate. Herr Max Leichtlin, a wonderfully successful cultivator of choice bulbous and other plants, says: "Placea is one of those bulbs which will not be pot-bound. I either plant them in a walled frame, which is kept free of frost, or in a low house which has a border on the south side, and is kept between 37deg. and 40deg. Fahr. at night, and leave them well alone. They go to rest about August, and push about December, flowering in May. In a pot, they ought to have their exact time of rest, and must be buried in the soil, which ought to be very rich; but in pots they are not certain to flower. They must be planted with at least an inch of soil over their necks, and they prefer a loose soil. I use thoroughly-decomposed cow-manure (three and four years old), mixed, during decomposition, with one-third silver sand." The three best-known species are here described.

FIG. 195. FLOWERS OF PLACEA ARZÆ.

P. Arzæ (Arza's). *fl.* pale yellow, lined with purple; corona monophyllous, base yellow, apex purple; umbel three to five-flowered; scape 1½ft. high. *l.* two, glaucous, 9in. long, ½in. broad. Bulb 2½in. in diameter. See Fig. 195.

P. grandiflora (large-flowered). *fl.* white, freely striped with bright crimson, large; scape erect, terminating in an umbel of several handsome flowers. *l.* few, linear, long, rounded and fistulose at the margin. 1869. This, the finest species of the genus, resembles *P. ornata*, but is much larger. (I. H. 574.)

P. ornata (adorned). *fl.* snow-white, lined with brilliant vermilion within; segments spathulate-oblong; corona white, scarlet at apex; scape 8in. to 9in. high, four to seven-flowered. May. *l.* linear, shining, obtusely keeled below. 1840. (B. R. xxvii. 50.)

PLACENTA. The part on which the ovules originate.

PLACENTIFORM. Quoit-shaped, or like a flat cake in form.

PLACODIUM. A synonym of **Plocama** (which *see*).

PLACOMA. A synonym of **Plocama** (which *see*).

PLADERA. A synonym of **Canscora** (which *see*).

PLAGIANTHUS (from *plagios*, oblique, and *anthos*, a flower; referring to the usually unequal-sided petals). Cotton-tree; Ribbon-tree. ORD. *Malvaceæ.* A genus comprising about eleven species of greenhouse or half-hardy shrubs, or rarely herbs, natives of Australia and New Zealand. Flowers white, often small, in the axils or in terminal crowded spikes, rarely solitary or disposed in short axillary panicles; calyx five-toothed or five-fid. Leaves entire, sinuate, angled, or rarely lobed. The species described below are half-hardy shrubs, except where otherwise stated. For culture, *see* **Malvaviscus.**

P. betulinus (Birch-like). *fl.* small, on slender, ebracteolate pedicels; panicles terminal, much-branched, very many-flowered, stellate-tomentose. Summer. *l.* of young plants ¼in. to ½in. long, rounded-ovate, variously crenate and lobed; in full-grown specimens, 1in. to 2in. long, ovate or ovate-lanceolate, acuminate, rounded or cuneate at base, coarsely crenate-serrate or obtusely doubly serrate. *h.* (in its native place) 40ft. to 70ft. New Zealand, 1870.

P. divaricatus (straggling). *fl.* in axillary fascicles or on one-flowered peduncles, shorter than the leaves. June. *l.* ⅛in. to ¾in. long, narrow-linear or sub-cuneate, obtuse, quite entire, one-nerved. Branches slender, spreading, tough. *h.* 8ft. New Zealand, 1820. As this species is only found in salt marshes, where very few shrubby plants thrive, its cultivation in such places might prove beneficial. (B. M. 3271.)

P. Lampenii (Rev. R. Lampen's).* *fl.* very pale yellow, almost white; petals five, roundish-oblong, much longer than the calyx; panicles short, leafy, axillary. November to February. *l.* shortly petiolate, oblong-lanceolate, acute, 4in. to 5in. long, sharply and regularly serrated, deep green above, hoary beneath. *h.* 6ft. to 8ft. Van Diemen's Land, 1833. (G. C. n. s., xxii. 201.)

P. Lyallii (Lyall's).* *fl.* ¾in. broad, drooping, axillary; peduncles one-flowered, solitary or fascicled, ebracteolate, about as long as the petioles. July. *l.* 2in. to 4in. long, ovate-cordate, acuminate, deeply and doubly crenated; petioles ½in. to 1½in. long. *h.* 20ft. New Zealand, 1871. A handsome, greenhouse, sub-deciduous shrub. (B. M. 5935.)

P. pulchellus (pretty). *fl.* small, clustered along the rachis of axillary racemes; males pedicellate, females sessile. Summer. *l.* on rather long petioles, from deeply cordate-ovate to lanceolate, often acuminate, 2in. to 3in. (or rarely more) long, coarsely crenate. Australia. Tall greenhouse shrub or small tree. (B. M. 2753, under name of *Sida pulchella.*)

P. sidoides (Sida-like). *fl.* small, in short, axillary racemes, the males with a campanulate, the females with a tubular, calyx. Summer. *l.* from ovate-lanceolate to lanceolate, obtusely serrate, 2in. to 3in., or rarely 4in., long, rounded at base, on petioles ¼in. to ½in. long, glabrous on the upper side when full grown, with numerous impressed veins. *h.* 4ft. Australia. Greenhouse. (B. M. 3396.)

PLAGIOGYRIA. Included under *Lomaria.*

PLAGIOLIRION (from *plagios*, oblique, and *leirion*, a lily; in allusion to the shape of the perianth). ORD. *Amaryllideæ.* A monotypic genus, requiring treatment similar to **Eucharis** (which *see*).

P. Horsmanni (Horsmann's).* *fl.* white, not scented, small, disposed in a scapose, ten to twelve-flowered umbel; perianth irregular, one segment being directed downwards, and the other five ascending. June and July. *l.* two or three to a stem, stalked, elliptic, acute, bright green above, light green beneath. Bulb long-necked. Columbia, 1883. (G. C. n. s., xx. 105, Fig. 16.)

PLAGIOLOBIUM. Included under *Hovea.*

PLAGIOPHYLLUM. A synonym of **Centradenia** (which *see*).

PLAITED. Folded lengthwise, like the plaits of a closed fan.

PLANE. Flat; level.

PLANERA (named in honour of I. J. Planer, a German botanist, who published a Flora of Erfurt, in 1788). ORD. *Urticaceæ*. A monotypic genus. The species is a hardy, deciduous, unarmed tree, probably not now in cultivation in Britain. It requires culture similar to **Ulmus** (which *see*).

P. aquatica (aquatic). Planer-tree. *fl.* brown, clustered; perianth four or five-fid. March and April. *fr.* nut-like, oblique, ovate, compressed, wingless. *l.* 1in. to 1½in. long, alternate, distichous, shortly stalked, serrated, ovate, acute, roughish, penniveined; stipules free, caducous. *h.* 20ft. to 30ft. Southern United States, 1816. SYN. *P. Gmelini*.

P. Gmelini (Gmelin's). A synonym of *P. aquatica*.

PLANER-TREE. *See* **Planera aquatica.**

PLANE-TREE. *See* **Platanus.**

PLANE-TREE, SCOTCH. A general name in Scotland for *Acer Pseudo-platanus*.

PLANTAGINEÆ. A natural order of herbs, sometimes annual or perennial, almost stemless or stolon-bearing, sometimes shortly caulescent, branched or suffruticose, glabrous, simply pilose, or woolly in the axils; they are natives of the temperate regions of both hemispheres, especially in Europe and North America, and are but rarely met with in the tropics. Flowers regular, hermaphrodite or monœcious, small, in elongated or shortened spikes, or rarely solitary and sessile in the axils of the often scarious bracts; calyx four-parted, with closely-imbricated segments, persistent in the fruit; corolla hypogynous, gamopetalous, scarious, marcescent, with an ovoid or cylindrical tube, and four spreading, imbricated lobes, sometimes wanting in the female flowers; stamens four, or fewer. Fruit a one or more celled, one or more seeded, membranous capsule, stipitate or included. Leaves radical, or in the caulescent species alternate, rarely opposite, one to many-nerved, entire, toothed, or pinnatifid, sometimes sheathed; petioles usually dilated at the base, and accompanied by a woolly membrane. Several species of *Plantago* are employed in medicine. The order comprises only three genera—*Bougueria*, *Littorella*, and *Plantago*—and perhaps about 200 species.

PLANTAGO (the old Latin name of the genus, used by Pliny). Plantain. ORD. *Plantagineæ*. This genus comprises all the species of the order (which *see* for characters) save two. They are of very little importance from a garden standpoint. *P. Coronopus*, *P. lanceolata*, *P. major*, *P. maritima*, and *P. media*, are British plants. *P. brasiliensis* is sometimes seen in botanic gardens. All thrive in ordinary soil, and may be readily raised from seed; the perennial species may also be propagated by division.

P. brasiliensis (Brazilian). *fl.* whitish, disposed in a compact, cylindrical spike, about 3in. long: scape axillary, solitary, rounded, twice as long as the leaves, clothed with white, adpressed hairs. Summer. *l.* linear-lanceolate, smooth, three-nerved, entire, with the margins somewhat thickened, much narrowed towards the base, and dilated again at the stem, which they embrace. *h.* 1ft. Brazil, 1823. (B. M. 2616.)

PLANTAIN. *See* **Plantago.** The name is also applied to other plants.

PLANTAIN LILY. A common name for *Funkia*.

PLANTAIN-TREE. *See* **Musa.**

PLANTAIN-TREE, MAURITIUS. *See* **Musa rosacea.**

PLANT-BOXES AND CASES. Plant-boxes are used for large trees or shrubs that cannot be provided with pots of sufficient size to contain the roots. They are usually made of wood, but sometimes of slate, and the sides may be constructed so as to be movable, for allowing the roots and drainage to be examined, should it become necessary. Boxes made of slate have the advantage of great durability, and they are readily kept clean. Special provision should be made to insure drainage, and Boxes containing trees of large dimensions should, for this reason, be stood on something to keep them a little above the ground level. Plant or Cutting-boxes, about 3in. deep, for raising seedlings and

Plant-boxes and Cases—*continued.*

growing-on tender bedding plants, are extremely useful; they answer well if the wood is merely planed over before being made up.

Boxes for window plants should be about 6in. deep: a less depth does not afford room for sufficient soil to sustain the plants for a season.

Plant-cases used outside windows, and also in rooms, require their occupants renewed occasionally, but not very frequently, if flowering plants are excluded. Many of the hardier species of Palms, greenhouse Ferns, Selaginellas, &c., are admirably adapted for the decoration of Plant-cases; tender or delicate subjects should not be included, unless the Cases are utilised for special purposes inside a glass structure.

An inclosed portion of a propagating-house, wherein cuttings of larger than ordinary size are inserted, is also termed a Plant or Propagating-case.

PLANTIA. Included under *Hexaglottis*.

PLANTING. *See* **Transplanting.**

PLANT LICE. *See* **Aphides.**

PLANT MITES. *See* **Mites.**

PLANT-PROTECTORS. These are very numerous, as the term is applicable to anything which acts, if only temporarily, to preserve plants from injury. Bell glasses, handlights, small movable frames, and even panes of glass, amongst many other things, may be termed appliances for plant-protection, when they are used as such to ward off heavy rains or severe frost. Full information will be found under **Bass or Bast Mats, Bell Glasses or Cloches, Cocoa-nut Fibre Refuse, Frames, Glass, Hand Glasses, Netting, Straw, Willesden Paper,** &c.

PLASMODIOPHORA BRASSICÆ. This is the cause of the disease known as "Clubroot," sometimes called also "Finger-and-Toe," in Turnips, Cabbages, Charlock, and other species of the genus *Brassica*, and also in *Raphanus Raphanistrum*, or Wild Mustard. It is a Fungus of very simple structure, and belongs to the curious group called *Myxomycetes*, the species in which, while vegetating, consist of minute, naked masses of protoplasm, endowed with a power of movement, by changing their forms, like the low microscopic animals called *Amœbæ*. These small, naked masses tend to unite when they meet, and thus they increase in size, and form what are called plasmodia. In some of the species, the plasmodia may reach a size of 2in. or more in breadth, and resemble a mass of clear or muddy-looking jelly. After a time, the plasmodia become covered with a firm coat, and break up into myriads of small, round cells, or spores, each inclosed in a cell-wall. These spores may remain for a time unchanged; but, under favourable circumstances, they burst, throw off the cell-wall, and appear as very minute plasmodia, which go through the same development as before. Almost all the *Myxomycetes* live on decaying organic matter, but *P. Brassicæ* does not. Its plasmodia are always minute, and they penetrate into the tissues of its hosts. The roots of a plant attacked by "Finger-and-Toe" vary considerably in appearance, according to the stage of the attack. The branch-roots very often bear swellings much exceeding the proper thickness of these roots. The swellings are usually spindle-shaped or roundish; at first, they are nearly smooth, but after some time they become rough. The main root is also often injured, as shown by its enlarged size, and, frequently, by its roughly-fingered appearance. In the autumn, and as winter advances, the diseased portion becomes more and more pulpy and decayed, and is also overgrown with other Fungi, which find their food in the rotting mass. Towards the end of winter, only the woody bundles of the roots remain moderately firm, the cellular tissues having dried up, and resembling coarse dust.

Plasmodiophora Brassicæ—*continued.*

Microscopic inspection of a thin slice from a diseased portion of a root, shows numerous cells of the tissue of the host-plant hardly altered in any way; but, intermixed with these, there are many others, from four to six times their diameter, which are occupied by the parasite; and it is these enlarged cells that alter the colour of the root, and make its surface in a transverse section, when a little magnified, look mottled. In the newly-diseased roots, these enlarged cells inclose a slimy, yellowish, granular plasm, in which are usually numerous cavities, filled with cell sap or with air. If examined at a later period, these enlarged cells are found filled with myriads of the minute, globular, thin-walled, transparent spores of *P. Brassicæ*. These remain uninjured during the keenest frosts of winter, and form a large part of the powdery material that fills up the decayed root between the woody bundles, and they become widely scattered through the soil by the action of wind and rain. When the weather becomes warmer, in the following spring, they begin to germinate, the cell-wall splits, and the protoplasmic contents pass out, and creep about through the damp soil like *Amœbæ*, and also by the help of a slender hair or cilium at one part. When they come into contact with others like themselves, they unite completely, and form larger plasmodia. If they meet with young roots of Cabbages, Turnips, Charlock, or Wild Mustard, they make their way into them, and produce the disease in them also.

This disease has, of late years, been spreading far and wide, and has proved very destructive in Turnip fields; so much so, that, in some districts, Turnips are no longer a profitable crop. It also attacks Turnips and Cabbages in vegetable gardens, though the less extended diffusion of the host-plants renders the attacks less fatal, and remedies more readily applicable. Frequent experiments have shown that, in soil in which diseased roots have been allowed to rot, a new crop of Cabbages, or other host-plants, will certainly suffer from disease if sown in that soil in the ensuing year. Even after a year has elapsed, the crop is liable to suffer from this cause, though to a less extent. Yet farmers almost always, and gardeners frequently, leave the diseased roots in the soil, as not repaying the labour of pulling them up. Experiments have been conducted by Mr. T. Jamieson, to ascertain the result of different manures on this disease, and have led him to the conclusion that the use of superphosphates, or soluble phosphates, is followed by a great increase of disease; and that ground coprolites, and ground or steamed bone-flour, are the manures that best enable the plants to resist it; but these conclusions are opposed by other experimenters. If the effects on Charlock, Wild Mustard, and Cabbages, are compared with those on cultivated Turnips, it is at once seen that the last plant suffers far more severely. The cause seems to be that the Fungus attacks the cellular tissue only, and this in Turnips is very largely developed, as it is this that renders the roots useful for food, and, accordingly, it has been promoted by the selection of those varieties for propagation that produce the largest roots with least woody fibre in them. The former plants are crippled, but are generally able to produce some seeds; but the Turnips are, in general, destroyed before they reach the stage to form seeds.

Remedies. All diseased roots ought to be collected at as early a stage as possible, and destroyed by burning, if this is practicable. Ground where Turnips have become diseased should not have Turnips or Cabbages grown in it for at least two years, to permit any spores in the soil to germinate, and thus to starve and kill the plasmodia. With the same object, all Charlock and Wild Mustard should be carefully eradicated, both from the ground and from its neighbourhood. Further experiments upon the effect of different manures are desirable, but, in the meantime, they point to ground coprolites, and to

Plasmodiophora Brassicæ—*continued.*

ground or steamed bone-flour, as the best artificial manure for Turnips. Unfortunately, no means are known for the cure of plants already attacked, prevention alone being practicable in any way.

PLATANACEÆ. A very small natural order of usually tall trees, with flaking bark; they inhabit the temperate or sub-tropical regions of the Northern hemisphere, two are natives of East Europe or Asia, and the rest are American. Flowers monœcious, in unisexual, globose, densely-crowded heads; "the stamens in the males, and the ovaries in the females, are mixed, without definite order, with scales, which may be bracts, perianth segments, or staminodes, or arrested ovaries" (J. D. Hooker). Fruit a nut. Leaves alternate, petiolate, broad, palmately nerved and lobed; petioles dilated at base; stipules membranous, caducous. The only genus of the order—*Platanus*—comprises only five or six species, which are mainly valuable for their timber and ornamental appearance.

PLATANTHERA. Included under **Habenaria** (which *see*).

PLATANUS (*Platanos*, the old Greek name, from *platys*, broad; referring to the foliage). Plane-tree. The only genus of ORD. *Platanaceæ* (which *see* for characters, &c.). The two species described below are magnificent trees for parks and similar situations. Both require a deep, rich, soft soil, and generally attain the greatest size where their roots have access to water. They require shelter, but must not be confined. Propagated by seeds, or by layers. The former are contained in round balls, which require to be broken, and should be sown in March; merely pressing them into the surface of the soil is sufficient, but they must be kept moist and shaded. The quickest way to propagate is from layers.

P. occidentalis (Western).* Button-wood; Western Plane. *fl.* greenish. May. *fr.* brownish; ripe in October and November. *l.* five-angled, obsoletely lobed, dentate, wedge-shaped at the base, downy beneath. *h.* 70ft. to 80ft. Atlantic and Western States, 1636. A fine species, differing from *P. orientalis* in its less deeply-lobed, more coriaceous, pubescent leaves, and in the fertile catkins being solitary on the long peduncles. It is rare in British gardens, and apparently not so hardy as the common species. (E. T. S. M. ed. 2, 261.)

P. orientalis (Eastern).* Oriental or Common Plane. *fl.* greenish-yellow. April. *fr.* brown; ripe in October, and persistent for the greater part of the winter. *l.* five-lobed, palmate, wedge-shaped at the base, the divisions lanceolate, sinuated; stipules nearly entire. *h.* 60ft. to 80ft. Levant, previous to 1548. (W. D. B. 101.) A beautiful tree, presenting a great variety of handsome forms, which differ chiefly in the shape and lobing of the leaves. The variety *acerifolia* (Maple-leaved) is the commonest in cultivation, frequently bearing the name of *P. occidentalis*, from which it may be readily distinguished when in fruit by the peduncles bearing more than one ball, and frequently many. It is the form known as the London Plane, on account of its being generally planted in the parks; and is an erect-growing tree, with usually three-lobed leaves, or, if five-lobed, less deeply so than in the typical form. (W. D. B. 100, under name of *P. occidentalis*.) The typical *orientalis* is a more spreading tree, with very large, deeply five-lobed leaves, cordate or truncate at the base. The variety *cuneata* has the leaves distinctly wedge-shaped at the base; *laciniata*, very deeply, much-divided leaves; and *variegata*, variegated foliage.

A plant in gardens, with fine bold foliage, called *P. californica*, has not yet fruited in this country; it is doubtful whether it really is the Californian *P. racemosa* (with which the true *P. californica* is synonymous).

PLATYCAPNOS. Included under **Fumaria** (which *see*).

PLATYCARPHA (from *platys*, broad, and *carphe*, chaff; in allusion to the broad, chaffy scales of the involucre). ORD. *Compositæ*. A genus consisting of a couple of species of stemless perennials from South Africa. Flower-heads purple, densely crowded, many-flowered, homogamous, sessile. Leaves numerous, stalked, spreading like a star upon the ground, pinnately divided, with coarsely-toothed lobes and pungent teeth. *P. glomerata* is a pretty and interesting plant; it thrives in a well-drained, sandy soil.

PLATYCARPUM (from *platys*, broad, and *karpos*, a fruit; alluding to the shape of the capsule). ORD. *Rubiaceæ*. A monotypic genus. The species is a tall, stove tree, with robust, opposite, terete branches. A compost of loam and leaf mould will suit it. Propagation may be effected by half-ripened cuttings, inserted in sand, under a glass. Keeping the plants rather dry during the winter, has a tendency to bring them into flower.

P. orenocense (Orinoco). *fl.* pale rose-colour, mediocre, disposed in terminal, trichotomously-branched panicles, pedicellate, ebracteate, and ebracteolate; calyx five-lobed, rather large, deciduous; corolla hypocraterimorphous, silky, with a short tube, and a limb of five equal, broadly oblong, imbricated lobes. Capsule somewhat woody, 1in. in diameter. *l.* oblong, 5in. to 6in. long, 2in. to 2½in. broad, opposite, petiolate, coriaceous, tomentose; petioles about ¼in. long. *h.* 20ft. Orinoco, 1813.

PLATYCARYA (from *platys*, broad, and *karyon*, a nut; alluding to the shape of the fruit). SYN. *Fortunea*. ORD. *Juglandeæ*. A monotypic genus. The species is an elegant, branching shrub or small tree, hardy only in favoured situations in the South of England. It thrives, however, in a cool conservatory, and, when planted out, will do well in almost any soil, requiring culture similar to **Juglans** (which *see*).

P. strobilacea (cone-fruited). *fl.* yellow; spikes all cylindrical, many-flowered, erect, many-bracted. August. *l.* five to eight-jugate, aromatic; leaflets ovate-lanceolate, acuminate, sessile, opposite, with serrulated margins. Japan and North China, 1844. (S. Z. F. J. 149.) SYN. *Fortunæa chinensis*.

PLATYCERIUM (from *platys*, broad, and *keras*, a horn; the fronds are divided into broad segments like stags' horns). Elk's-horn or Stag's-horn Fern. ORD. *Filices*. A small genus (about half-a-dozen species) of mostly stove ferns, widely diffused; they are readily distinguishable by their dichotomously-forked fertile fronds, with stag's-horn-like divisions. Sori forming large patches on the upper part of the lower surface of the fertile fronds. The Platyceriums may be considered at once amongst the grandest, most beautiful, and most extraordinary, of the whole order. They are distinct, epiphytal ferns, and thrive well in baskets or shallow pans. They also succeed when fastened to a large block of wood, with a little peat and sphagnum round their roots, and suspended in the stove. Rough peat and sphagnum form a suitable compost in which to pot them. The species described below require stove treatment, except where otherwise stated. *See also* **Ferns.**

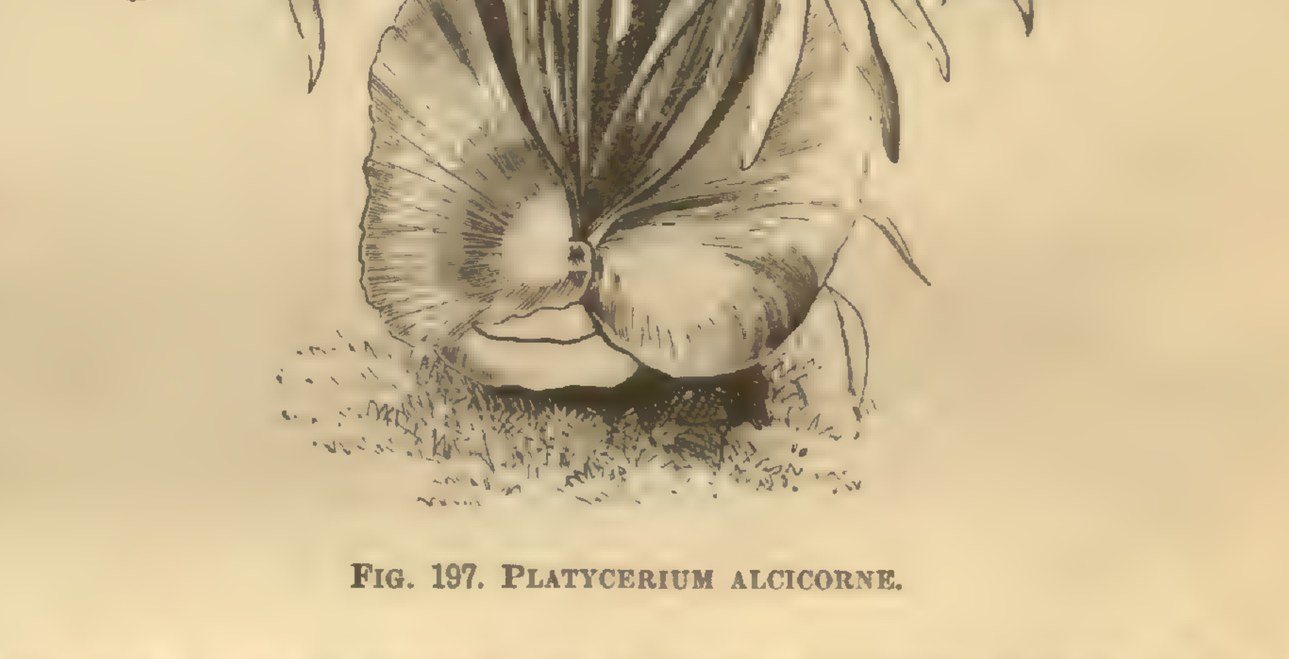

FIG. 197. PLATYCERIUM ALCICORNE.

FIG. 196. UPPER PORTION OF FERTILE FROND OF PLATYCERIUM ÆTHIOPICUM.

P. æthiopicum (African). *barren fronds* rounded, convex, downy when young, the edge more or less lobed, the lobes spreading. *fertile fronds* 2ft. to 3ft. long, clustered, pendent, twice trichotomous, the disk and first division broader than in *P. alcicorne*, the patch of fruit surrounding the sinus, and passing into the fork so as to be shaped like the letter V; under surface covered with thin, white, cottony down. Guinea Coast and Angola, 1822. See Fig. 196. (H. G. F. 9.) SYN. *P. Stemmaria*.

P. æ. angolense (Angolan). A form having a broad-cuneate fertile frond, 9in. broad at the top, without either forks or horns, and with a patch of fruit nearly as broad as the lamina.

P. alcicorne (elk's-horn).* *barren fronds* rounded, convex, downy when young, the edge sinuated, the lobes spreading. *fertile fronds* 2ft. to 3ft. long, clustered, erect, two or three times dichotomous; ultimate divisions ligulate, bluntish, the fruit in the last forks, and at their base, in very irregular patches; under surface covered with thin, cottony down. Temperate Australia, &c., 1808. Greenhouse. See Fig. 197. The large form, *majus*, comes from Polynesia.

P. biforme (two-formed). *barren fronds* very thick, especially towards the base, imbricated, the edge sinuate-lobed. *fertile fronds* 6ft. to 15ft. long, repeatedly dichotomous from a sub-cuneate disk; barren divisions narrow-ligulate; fertile ones reniform, stalked, 6in. to 8in. broad, the outer edge rounded, entire. East Indies, 1842.

P. grande (grand).* *barren fronds* very large, sub-orbicular, convex, or the upper ones erect, deeply laciniated with spreading or inflexed divisions. *fertile fronds* 4ft. to 6ft. long, pendent, in pairs, the disk broad-cuneate, with the sorus against the upper edge, occupying the

Platycerium—*continued.*

FIG. 198. PLATYCERIUM GRANDE.

disk only, with an elongated, dichotomously-forked division beyond it at each corner. North Australia, 1828. See Fig. 198.

P. Hillii (Hill's).* *fronds* about 1½ft. long, flabellately branched in the upper third, the part just below the branching about 8in. broad, gradually tapering downwards into short stipes; mature fronds very thinly covered with white stellate hairs. *sori* forming small, roundish or oblong spots at the base of the ultimate lobes, or about an equal distance from the apex if there is no side lobe. Queensland, 1878. Allied to *P. alcicorne*. (G. C. n. s., x. 74, 75.)

P. Stemmaria (Stemmaria). A synonym of *P. æthiopicum*.

P. Wallichii (Wallich's).* *barren fronds* deeply lobed, with inflexed, forked divisions. *fertile fronds* in pairs, pendent, each in two divisions, in each of which the cuneate disk has a rounded upper edge, occupied by a sorus; from either side of the sorus a one-forked division is produced; under surface matted with yellowish woolly pubescence. Malay Peninsula, 1860.

P. Willinckii (Willinck's).* *barren fronds* erect, sub-orbicular, lobed. *fertile fronds* in threes, elongated, drooping, narrowly cuneate, dichotomously cut up into narrow-ensiform lobes. *sori* occupying the terminal lobes. Java, 1875. (G. C. n. s., iii. 56.)

PLATYCHILUM. Included under *Hovea*.

PLATYCLINIS (from *platys*, broad, and *clinis*, a couch; alluding to the broad, membranous clinandrium). SYN. *Dendrochilum* (in part). ORD. *Orchideæ*. A genus comprising about eight species (formerly referred to *Dendrochilum*) of stove, epiphytal orchids, with stems tufted at base, or sub-ramose and simple and one-leaved towards the base, and scarcely thickened or narrowly pseudo-bulbous; they are natives of the East Indies and the Malayan Archipelago. Flowers small, in numerous, terminal racemes, shortly pedicellate; sepals narrow, spreading; petals similar or smaller; lip sessile or shortly unguiculate at the base of the column, ovate, concave, almost equalling the sepals; column erect, semi-terete; anthers two-valved; pollen masses four, ovoid. Leaves narrow, contracted into petioles. The species described below, which are those best known to gardeners, thrive well in pots, in a mixture like that recommended for **Liparis**.

P. Cobbiana (Cobb's). *fl.*, sepals and petals sulphur-coloured; lip orange-coloured, flabellate; inflorescence zigzag. *l.* and pseudo-bulbs like those of *Dendrochilum latifolium*. Philippines, 1881. SYN. *Dendrochilum Cobbianum*.

P. filiformis (thread-like). *fl.* pale yellow, small, in long, thread-

Platyclinis—*continued.*

like racemes. *l.* linear-lanceolate. Pseudo-bulbs small, conical. Manilla, 1836. (I. H. 1878, 323, under name of *Dendrochilum glumaceum*.) SYN. *Dendrochilum filiforme*.

P. glumacea (glumaceous). *fl.* white, very fragrant, sessile, in a linear-oblong, pendulous, elongated spike, borne on the curved peduncle. *l.* solitary, broad-lanceolate, rather obtuse, striated, tapering into a long footstalk, which is inclosed by the sheathing scale. Pseudo-bulbs crowded, the younger ones clothed with two or more large, generally reddish scales, within which is a much larger, sheathing scale, 3in. to 4in. long, tinged with red. Philippines. (B. M. 4853, under name of *Dendrochilum glumaceum*.)

PLATYCODON (from *platys*, broad, and *kodon*, a bell; referring to the form of the flower). ORD. *Campanulaceæ*. A monotypic genus, the species being a very ornamental, hardy, erect, glabrous, glaucescent, herbaceous perennial. For culture, *see* **Campanula.**

P. autumnalis (autumnal). A synonym of *P. grandiflorum*.

P. chinensis (Chinese). A synonym of *P. grandiflorum*.

P. grandiflorum (large-flowered).* Chinese Bell-flower. *fl.* blue, large, solitary or few at the tips of the branches; calyx tube adnate, turbinate, limb five-parted; corolla campanulate, five-lobed; inflorescence centrifugal. July. *l.* scattered, often opposite or whorled, sub-sessile, ovate, lanceolate, toothed. *h.* 6in. to 12in. China, Mandschuria, and Japan, 1782. See Fig. 199. (S. B. F. G. ser. ii. 208.) SYNS. *P. autumnalis* (L. J. F. 250), *P. chinensis* (L. & P. F. G. ii. 61), *Campanula grandiflora* (B. M. 252).

P. g. Mariesii (Maries'). This is a recently-introduced form, with larger flowers, and of dwarfer habit, than the type. (Gn., March, 1885.)

FIG. 199. UPPER PORTION OF PLANT OF PLATYCODON GRANDIFLORUM.

PLATYCRATER (from *platys*, broad, and *krater*, a bowl; alluding to the expanded calyx of the barren flowers). ORD. *Saxifrageæ*. A monotypic genus, the species being a hardy, prostrate or creeping shrub, with

Platycrater—*continued.*

terete branches. It requires culture similar to **Philadelphus** (which *see*).

P. arguta (sharp). *fl.* greenish-white, scattered, much larger than those of *Hydrangea*, disposed on long pedicels, in terminal, few-flowered corymbs; calyx limb dilated, petaloid, three or four-lobed; petals four, valvate. *l.* opposite, shortly petiolate, deciduous, lanceolate, long-attenuated, acuminate, deeply toothed, veined. Japan, 1866. (R. G. 516; S. Z. F. J. 27.)

PLATYLEPIS (from *platys*, broad, and *lepis*, a scale; alluding to the shape of the sepals). SYNS. *Diplogastra, Notiophrys.* ORD. *Orchideæ.* A genus comprising three (or five?) species of stove, terrestrial orchids, natives of tropical and Southern sub-tropical Africa and the Mascarene Islands. Flowers narrow, in dense, sessile, glandular-pubescent spikes; sepals subequal, narrow; petals narrow, sub-coherent with the dorsal sepal; lip sessile at the base of the column, erect, concave-channelled. Leaves ovate or ovate-lanceolate, membranous, contracted into the petioles. Stems ascending, leafy. Rhizome creeping. The species are not known in cultivation.

PLATYLOBIUM (from *platys*, broad, and *lobos*, a pod; in reference to the broad legumes). Flat Pea. ORD. *Leguminosæ.* A small genus (three species) of Australian, greenhouse shrubs, with slender branches. Flowers yellow, solitary, in opposite axils; two upper calyx lobes very large, free or shortly united; lower ones small and narrow; petals clawed; standard orbicular or reniform; wings oblong-obovate, much shorter; bracts brown and scarious. Pods sessile or stipitate, very flat. Leaves opposite, simple, entire, or with pungent angles. For culture, *see* **Hovea.**

P. formosum (beautiful).* *fl.*, standard nearly twice as long as the very hairy calyx; pedicels often fully ½in. long, always exserted from the bracts at their base. July. *l.* from broadly cordate to ovate, or rarely ovate-lanceolate, acute, 1in. to 2in. long, strongly reticulated, with a rigid point. *h.* 4ft. 1790. A handsome shrub. (B. M. 469; P. M. B. xiii. 195.)

P. f. parviflorum (small-flowered). A form with smaller flowers, shorter pedicels, and narrower leaves, than the type. *h.* 4ft. 1792. SYNS. *P. ovatum, P. parviflorum* (B. M. 1520; L. B. C. 1241; P. M. B. xi. 219).

P. Murrayanum (Murray's). A synonym of *P. triangulare.*

P. obtusangulum (obtuse-angled). *fl.*, standard shortly exceeding the very hairy calyx, which is about ½in. long; pedicels short, and completely concealed by the imbricate bracts at their base. May. *l.* from broadly triangular to ovate-cordate, hastate, or cordate-lanceolate, mostly ¾in. to 1in. long, with a pungent point, the lateral angles either acute and pungent or rounded and obtuse. *h.* 1ft. 1832. (B. M. 3258.) SYN. *P. triangulare* (B. M. 1508).

P. ovatum (ovate). A synonym of *P. formosum parviflorum.*

P. parviflorum (small-flowered). A synonym of *P. formosum parviflorum.*

P. triangulare (triangular).* *fl.*, standard reniform, deeply emarginate, about twice as long as the calyx, which is adpressedly hairy, and nearly ½in. long. May. *l.* broadly triangular or cordate-hastate, the angles terminating in short, pungent points, or the lower leaves rarely broadly cordate, with the lateral angles rounded, mainly ¾in. to 1in. long. *h.* 1ft. 1832. A straggling or procumbent shrub. SYN. *P. Murrayanum* (B. M. 3259).

P. triangulare (triangular), of Sims. A synonym of *P. obtusangulum.*

PLATYLOMA. Included under **Pellæa** (which *see*).

PLATYLOPHUS (from *platys*, broad, and *lophos*, a crest; the capsule is so much compressed at the apex as to appear winged). SYN. *Trimerisma.* ORD. *Saxifrageæ.* A monotypic genus. The species is an elegant, greenhouse, glabrous, evergreen tree, thriving best in a compost of loam and peat. Propagated, during April or May, by cuttings of ripe shoots, inserted in sand, under a glass.

P. trifoliata (three-leaved). White Alder. *fl.* white, disposed in axillary, long-stalked, many-flowered panicles. June. *l.* petiolate, ternate; leaflets sessile, lanceolate, acuminated, sharply serrated, coriaceous, reticulated with many veins. *h.* 40ft. to 50ft. Cape of Good Hope, 1820. SYN. *Weinmannia trifoliata.*

PLATYMETRA. A synonym of **Tupistra** (which *see*).

PLATYPETALUM (from *platys*, broad, and *petalum*, a petal). ORD. *Cruciferæ.* A small genus of hardy, herbaceous perennials, with purplish flowers, now included, by Bentham and Hooker, under *Braya.* The species have no horticultural value.

PLATYPTERIS. Included under **Verbesina** (which *see*).

PLATYS. A term which, used in Greek compounds, signifies broad; *e.g.*, Platyphyllus, broad-leaved.

PLATYSTEMON (from *platys*, broad, and *stemon*, a stamen; alluding to the expanded filaments). ORD. *Papaveraceæ.* A monotypic genus. The species is a pretty, hardy annual, requiring culture similar to that recommended for **Papaver.**

P. californicus (Californian). Californian Poppy. *fl.* yellow; sepals three; petals six; peduncles elongated. July and August. *l.* narrow, entire; lower ones alternate; floral ones often nearly opposite or ternately whorled. *h.* 1ft. California, 1853. (B. ii. 65; B. M. 3579; B. R. 1679; S. B. F. G. ser. ii. 394.) The variety *leiocarpus* has smooth carpels. (B. M. 3750, under name of *P. leiocarpum.*)

PLATYSTIGMA (from *platys*, broad, and *stigma*; alluding to the broad stigmas). ORD. *Papaveraceæ.* A genus comprising three species of slender, half-hardy, annual herbs, natives of North-west America. Flowers yellow, often small, on elongated peduncles; sepals three; petals six; stamens many; filaments slightly dilated at apex. Leaves narrow, entire, approximate and alternate at the base of the stem, or almost opposite the flowers. For culture of the only species calling for description, *see* **Papaver.**

P. lineare (linear). *fl.* drooping before expansion, then erect; three outer petals full yellow, pale at the sides, obovate, the three inner ones narrower, white, yellow at the claw; scapes several from the same root, 9in. high. May. *l.* radical, linear, acute, glaucous, 2in. to 3in. long. 1833. (B. M. 3575; B. R. 1954.)

PLATYSTYLIS (of Sweet). Now included under **Lathyrus** (which *see*).

PLATYSTYLIS (of Blume). Now included under **Liparis** (which *see*).

PLATYTHECA (from *platys*, broad, and *theke*, a cell; alluding to the broad anther lobes). ORD. *Tremandreæ.* A monotypic genus, the species being an erect, Heath-like, greenhouse shrub or under-shrub. For culture, *see* **Tetratheca.**

P. galioides (Galium-like). *fl.* borne on slender pedicels; sepals narrow-lanceolate, acute; petals blue, with a dark spot at the base. June. *l.* usually about eight in a whorl, narrow-linear, acute and pungent, or obtuse with recurved points, about ½in. long, with the margins often revolute. *h.* 1ft. South-west Australia, 1845. (P. M. B. xiii. 171, under name of *Tetratheca verticillata.*)

PLATYZAMIA. A synonym of **Dioon** (which *see*).

PLATYZOMA (from *platys*, broad, and *zoma*, a band; in allusion to the broad ring of the sporangia). ORD. *Filices.* A monotypic genus. The species—*P. microphyllum*—is an Australian stove fern, closely allied to *Gleichenia.* It has not yet been introduced.

PLEASURE GROUNDS. *See* **Garden.**

PLECOSORUS. Included under *Cheilanthes.*

PLECTOCEPHALUS. Included under *Centaurea.*

PLECTOCOMIA (from *plektos*, plaited, and *kome*, leaves; probably from the leaves being used in plaiting). ORD. *Palmæ.* A genus comprising about half-a-dozen species of stove, climbing palms, allied to *Calamus*, armed with recurved prickles; they are natives of the mountains of India and the Malayan Archipelago. Flower-spikes axillary, divided into numerous, very long, tail-like branches, clothed with two opposite rows of overlapping spathes, each of which incloses a short spike of flowers. Fruit covered with overlapping scales, which are rough and fringed at the edges, giving the fruit a prickly appearance, one-seeded. Leaves large, pinnate, furnished with long, whip-like tails, beset on

Plectocomia—*continued.*

the under side with excessively strong, compound spines, shaped something like a mole's foot, with the claws directed downwards. The species, the best-known of which are described below, are very handsome plants, and are of easy culture. A compost of rich loam and peat, in about equal parts, is suitable. Propagated freely by suckers.

P. assamica (Assamese). *fl.*, spathes 2½in. to 3in. long; spadix large, the branches 2½ft. long. *l.* gracefully arched, broad and deeply bifid when young, ultimately pinnate; upper surface deep green, the under side a beautiful powdery-white. *h.* 80ft. Assam, 1841. An elegant plant. (B. M. 5106.)

P. elongata (elongated). *fl.*, spadix axillary; peduncle covered with imbricate, sheathing spathes. *l.* with the flagelli about 20ft. long; pinnules distant, arched downwards, linear-lanceolate, tapering to both ends, very acuminate, the longest 3ft. in length, 2in. to 3in. broad, coriaceous. Stem, in the lower part, almost as thick as the leg. India, 1869. A gigantic, climbing species.

P. himalayana (Himalayan). *fl.*, spathes almost stem-clasping, conduplicate; branches of the spadix about 2ft. long, covered with rusty tomentum. *l.* ample; pinnules alternate, linear-lanceolate, very acuminate, 1½ft. long, 1¾in. broad, the margins shortly toothed; pinniferous part of the petioles armed with stout, hooked prickles. Himalayas, 1878. A distinct and graceful palm.

PLECTOGYNE. Included under *Aspidistra.*

PLECTRANTHERA. A synonym of **Luxemburgia** (which *see*).

PLECTRANTHUS (from *plectron*, a spur, and *anthos*, a flower; in allusion to the corolla-tube being gibbous at base). Cockspur-flower. SYN. *Germanea.* ORD. *Labiatæ.* This genus comprises nearly seventy species of stove or greenhouse, perennial herbs, sub-shrubs, or rarely tall shrubs, natives of tropical and South Africa, tropical and sub-tropical Asia as far as Japan, the Malayan Archipelago, Australia, and the Pacific Islands. Flowers small or mediocre, often pedicellate; calyx of five equal or bilabiate teeth; corolla tube exserted, gibbous or oblique; limb bilabiate, the upper lobe three or four-fid, the lower one entire; whorls six to many-flowered, or cymes opposite and more or less evolute, racemose, thyrsoid, or loosely paniculate, rarely densely spicate. Nutlets ovoid or oblong, smooth or minutely dotted. Leaves variable, the floral ones reduced to small, deciduous bracts. The species best known to cultivation are described below. They do well in any light, rich soil. Propagation may be effected by cuttings which root readily.

FIG. 200. PLECTRANTHUS FRUTICOSUS, showing Habit and Portion of detached Inflorescence.

P. australis (Southern). *fl.* pale purple, on short, unequal pedicels; corolla almost thrice as long as the calyx; whorls rather loose, about ten-flowered, and ½in. apart; raceme elongated, simple. Summer. *l.* petiolate, broadly ovate, obtuse, inciso-crenate, rounded at base, slightly rugose, pubescent; floral ones round-ovate, deciduous. Stem herbaceous, erect, pubescent. *h.* 2ft. to 3ft. Australia. Greenhouse. (B. R. 1098.)

Plectranthus—*continued.*

P. barbatus (bearded). A synonym of *Coleus barbatus.*

P. coleoides (Coleus-like). *fl.* lilac; corolla four times as long as the calyx; panicle thyrsoid, 6in. long. Summer. *l.* petiolate, ovate, crenate, sub-cordate at base, rather thick, puberulous; floral ones deciduous. *h.* 1ft. to 2ft. Neilgherries, 1865. Stove herbaceous perennial. (B. M. 5841.) SYN. *Coleus Colvillei.*

P. comosus (tufted). A synonym of *Coleus barbatus.*

P. fœtidus (stinking). *fl.* purple (?); calyx softly villous; corolla thrice as long as the calyx; whorls many-flowered, approximate; racemes dense, slightly branched. Summer. *l.* shortly petiolate, broadly ovate, crenate, truncate or cordate at base, thick, much wrinkled, very villous on both sides; floral ones broadly ovate-cordate, acuminate, deciduous. Stem obtusely tetragonal. *h.* 3ft. to 5ft. Eastern Australia, 1877. Greenhouse sub-shrub. (B. M. 6792.)

P. Forskolei (Forskål's. A synonym of *Coleus barbatus.*

P. fruticosus (shrubby). *fl.* blue, elegant, disposed in a slightly-branched panicle; pedicels ¼in. long; corolla tube twice as long as the calyx. Summer. *l.* petiolate, broadly ovate, sub-cordate, doubly toothed, slightly glabrous; floral ones bract-like. *h.* 3ft. to 4ft. Cape Colony. Greenhouse shrub. See Fig. 200. (B. R. 1864, 431.)

P. ternatus (ternate). Onime-root. *fl.* purple, on short pedicels; corolla dark-dotted, thrice as long as the calyx; whorls ternate, rather loose, many-flowered; racemes simple. August. *l.* long-stalked, ovate-rotundate, acute, deeply crenate, narrowed at base, some fleshy, pubescent above, canescent beneath. Stem erect; branches cano-tomentose or pubescent. *h.* 1ft. Madagascar, 1821. Stove herbaceous perennial. (B. M. 2460.)

PLECTRITIS (from *plektron*, a spur; in allusion to the calcarate corolla). Including *Betckea.* ORD. *Valerianeæ.* A genus comprising only three species of erect, hardy, annual herbs, of which two are Californian, and the third Chilian. Flowers pink, in dense, capituliform cymes, axillary or terminal; corolla five-fid, spreading. Leaves entire or sinuate-toothed. Seeds of *P. congesta* only require to be sown in the open ground in May, in a sheltered situation. It is doubtful, however, whether the genus is still represented in our gardens.

P. congesta (crowded). *fl.* pink, in oval or oblong heads, often arranged in verticillate, approximate or distant glomerules; corolla manifestly bilabiate, with a small spur much shorter than the tube. June. *l.* very glabrous; radical ones obovate or spathulate, entire; cauline ones broadly ovate, sessile, slightly toothed; floral ones linear-oblong. *h.* 9in. to 18in. California, 1826. (B. R. 1094, under name of *Valerianella congesta.*)

PLECTRONIA (from *plektron*, a cock's spur; in allusion to the large spines which are to be found on some of the species). SYNS. *Canthium, Dondisia, Mitrastigma, Phallaria, Psilostoma, Psydrax.* ORD. *Rubiaceæ.* A large genus (about seventy species) of stove or greenhouse, unarmed or spiny, shrubs, sometimes climbing, with terete branchlets; they are natives of tropical Asia, Africa, and Australia, South Africa, and the Pacific Islands. Flowers white or greenish, small, fascicled or disposed in corymbose, pedunculate cymes; calyx with a short tube, and a very short, truncate or four or five-toothed limb; corolla tube short or slightly elongated, with four or five ovate-triangular lobes. Fruit small or mediocre. Leaves opposite, membranous or coriaceous, shortly petiolate, oblong, ovate, or lanceolate; stipules intrapetiolar. Few of the species have been introduced, and none are important horticulturally.

PLECTRURUS. A synonym of **Tipularia.**

PLEEA (named after Aug. Plée, 1787-1825, author of a work on the Flora of the Environs of Paris). ORD. *Liliaceæ.* A monotypic genus. The species is a hardy, perennial herb, with nodose, erect, Rush-like stems or rhizomes. It thrives in peat soil, and requires a moist situation; or it may be grown in pots, placed in pans of water. Propagation may be effected by seeds.

P. tenuifolia (slender-leaved). *fl.* white, greenish without, solitary between the bracts, pedicellate, erect, 1in. wide, disposed in simple racemes; perianth segments spreading. October. *l.*, radical ones few, rather long, linear, erect, somewhat rigid, 6in. to 9in. long; cauline ones one or two, long-sheathed, smaller than the radical ones. Stem 2ft. high. South United States, 1824. (B. M. 1956.)

PLEIONE. Included under **Cœlogyne** (which *see*).

PLEIOS. A term which, used in Greek compounds, signifies more than one; *e.g.*, Pleiophyllus, several-leaved.

PLENUS. Full; double. Applied to flowers in which the number of petals, &c., is abnormally multiplied.

PLEOCNEMIA. Included under **Nephrodium** (which *see*).

PLEOMELE. A synonym of **Dracæna** (which *see*).

PLEOMORPHISM. *See* **Pleomorphy.**

PLEOMORPHY, or **PLEOMORPHISM** (from *pleion*, several, and *morphe*, form; in allusion to the variability in the spores). A term used to express the condition observed in several groups of Fungi (*see* **Oidium, Peronospora, Pleospora, Puccinia,** and **Pyrenomycetes**), in which bodies of two or more forms are produced to effect reproduction of these plants under varying conditions; one form is, in some groups, known to be the result of sexual reproduction, *e.g.*, zygospores of *Peronospora*, ascospores of *Peziza* and *Pyrenomycetes*, &c., and to such the term "spore" is, by some botanists, restricted in theory, though this is scarcely adhered to in practice. All the other forms of bodies specialised for reproduction fall under the two types of conidia and sclerotia. In many plants, conidia of two or more kinds occur, either simultaneously or in succession, and in many Fungi (*e.g.*, *Hymenomycetes*, *Pucciniei*, &c.) no sexual form has yet been detected.

PLEOPELTIS. Included under **Polypodium** (which *see*).

PLEOSPORA. A genus of parasitic Fungi, belonging to the group of *Pyrenomycetes*, and to the sub-group *Sphæriaceæ*, in which the perithecia are globular or flask-shaped, and open by a circular pore or mouth to permit the escape of the spores. The perithecia are borne upon a mycelium, which penetrates the tissues of the host-plant; but they are quite separable from this mycelium. The genus is one of a section in which the perithecia are at first covered by the epidermis of the host-plant, through which, usually, they ultimately burst. The mycelium does not form an evident layer or mass (stroma). The perithecia are not very thick-walled, are dark brown, and generally smooth; the opening, or neck, usually projects from the stratum in which the bodies are sunk. Another form of spore (conidia) is usually produced on the surface on the same host. The spores produced in the asci, inside the perithecia, are divided by numerous cell-walls, crosswise and lengthwise, so as to resemble the arrangement of bricks in a wall, and they are usually some shade of brown, seldom colourless. A number of species of *Pleospora* exist, some parasitic on one plant, some on another; but most of them seem to be found in the perfect condition only on dead or dying stems and leaves, and are thus, in this stage, not hurtful to garden or field produce. A large proportion of the species have been found only on wild plants or on grasses; and there is considerable doubt as to the number of really distinct species, since many of the named forms are only varieties of the extremely common *P. herbarum*. It will be well to give here a brief description of the conclusions of mycologists with regard to the life-history of this species, as it is believed to be injurious to various garden plants in its earlier conditions; and several of these stages differ so much from one another, and from the mature condition, that they have been described as distinct species under widely-separated groups. This Fungus is supposed to be the cause of a disease of Potato-plants, characterised by retardation of growth and curling of the leaves, which become yellowish-green. On the leaf-stalks and stems there appear brown spots, at first round, but widening

Pleospora—*continued.*

out, and, after a time, the whole stalk, with its leaves, withers and dies. The formation of tubers is but small. Various other garden and field plants, and many wild plants, present diseased conditions that are generally referred to the action of *P. herbarum*. Some botanists are of opinion that experimental researches, by means of cultivation of the Fungus, show that two distinct species have been confounded under the name *P. herbarum*, and that these two can be distinguished in the earlier, though not easily, if at all, in the mature, state; and they have been named, by Gibelli, *P. Sarcinulæ* and *P. Alternariæ*. Practically, to gardeners, it matters little whether there are two species or only one, as both forms are common, and they agree in the mode of life.

The Fungus can seldom, if ever, be observed in plants of quite a healthy appearance; but it undoubtedly exerts its action some time before it is externally visible, and, in this period, the food-plant becomes penetrated by its colourless, branched mycelium. On this mycelium, near and on the surface of the plant, are formed the reproductive organs, in the form of conidia of two or three kinds, succeeded by the pycnidia and the perithecia. Both the latter are globular or flask-shaped bodies, with a narrowed neck, and a membranous, leathery or brittle, cellular coat. They are usually scattered plentifully on the surface of dead stems and leaves. The pycnidia are full of minute,

FIG. 201. PLEOSPORA HERBARUM, PYCNIDIAL STAGE (known as *Phoma herbarum*)—*a*, Pycnidia in transverse section, × 20, one opened; *b*, Conidia still on the Stalks, × 400; *c*, Conidia free after falling off the Stalks, × 400.

elliptical, transparent, one-celled bodies (see Fig. 201), borne on slender stalks from the inner surface of the walls. The perithecia are larger and darker than the pycnidia, and differ from these in the spores contained in them being inclosed in large, transparent, elongated, cells (asci). In each of these are eight spores (see

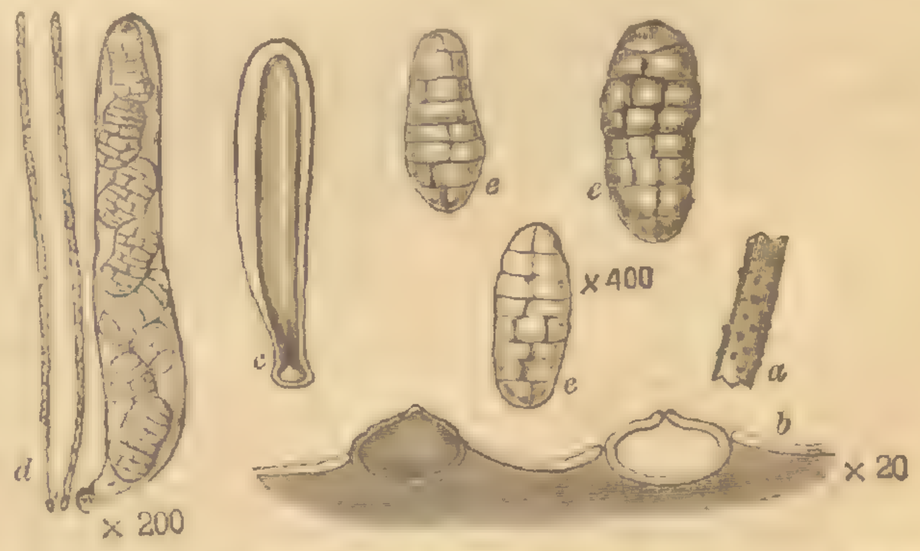

FIG. 202. PLEOSPORA HERBARUM, PERFECT STAGE, WITH ASCI—*a*, Piece of Herbaceous Stem, with Perithecia, natural size; *b*, Section of Stem, with two Perithecia, one opened, × 20; *c*, Unripe Ascus, × 200; *d*, Ripe Ascus, × 200, inclosing eight ripe Spores; *e*, *e*, *e*, Three Ripe Spores, × 400, showing differences in size, form, and divisions.

Fig. 202). The latter are some shade of brown, elliptical, narrowed in the middle, and show numerous partitions, of which seven are across the length, and others divide the spaces so formed into smaller spaces or cells. They are very much larger than the spores contained in the pycnidia. The conidia are formed, not in special receptacles, as in the former cases, but exposed on the surface of the plant. One of the earliest Fungi to appear on sickly plants in general is a bluish or greenish-grey coat

Pleospora—*continued.*

of erect filaments, each bearing on, or near, the tip one or two conidia of a cylindrical or elliptical form, and entire or two-celled. This Fungus, known as *Cladosporium herbarum* has long been regarded as an ill-developed condition of *Pleospora herbarum*; but recently it has been denied that *C. herbarum* is a stage in the development of *P. herbarum*. Other forms of conidia also occur, intermingled with the *Cladosporium*, which are admitted to be conditions of *P. herbarum*. These

FIG. 203. PLEOSPORA HERBARUM, MACROSPORE STAGE (known as *Macrosporium sarcinula*)—*a*, Conidium on Stalk (*st*); *b*, Conidium after falling from Stalk; *c*, Another Form of Conidium, more typical of *Sarcinula* Stage: all × 400.

latter forms (see Fig. 203) resemble, in their general appearance, the spores from the asci, *e.g.*, in the forms *Macrosporium sarcinula*, *Sporidesmium*, and *Alternaria Brassicæ*. Of these forms of conidia, *Macrosporium* and *Sporidesmium* are oblong, with blunt ends, and are divided, as shown in Fig. 203, both lengthwise and crosswise, by partition walls, and each conidium is produced on the end of a separate stalk. *Alternaria* has conidia produced on stalks, which may be sparingly branched; on the tip of each branch is a row of pear-shaped, many-celled conidia, attached by the broader end, and these separate very readily. The two forms *Macrosporium* and *Alternaria* are regarded by Gibelli as characteristic of the two species into which he divides *P. herbarum*, as mentioned above. All the forms of conidia now described germinate readily, and, in suitable conditions of moisture and nourishment, produce mycelium, which produces the Fungus anew. On the relationship of *Cladosporium herbarum* to the other forms greatly depends the view that must be taken of the disease-producing power of *P. herbarum*, and further investigations are required on this point.

Remedies. Unfortunately, these are hardly procurable, because of the wide diffusion and abundance of the Fungi, and the internal parasitism of the mycelium; but all diseased parts should be burned. The best method to prevent damage is to promote, in every way, healthy growth in the plants most liable to be attacked.

PLEROMA (from *pleroma*, fulness; referring to the cells of the capsule). SYN. *Lasiandra*. Including *Chætogastra*, *Melastoma*, *Micranthella*, and *Rhexia* (in part). ORD. *Melastomaceæ*. A genus containing about 124 species of stove or greenhouse shrubs and sub-shrubs, rarely perennial herbs, sometimes climbing, often strigoso-pilose or hispid, natives of tropical South America, being mostly Brazilian. Flowers violet or purple, usually disposed in terminal, trichotomously-branched panicles, large, sometimes with concave involucral bracts, very rarely four-parted; calyx tube ovoid, campanulate, urceolate or elongated, lobes five, as long as, or longer than, the tube; petals five, obovate, often unequilateral and retuse. Leaves frequently large, coriaceous, petiolate, ovate or oblong, entire, three to seven-nerved. The species thrive either in turfy loam or peat, preferably the former, and cuttings of half-ripened shoots root

Pleroma—*continued.*

readily in a close frame at almost any time of year when they can be obtained. *P. elegans* forms a fine exhibition plant when well grown, and *P. macranthum* is one of the most beautiful subjects for covering a pillar or rafter in a greenhouse or cool stove. A season of rest should be allowed Pleromas in winter; but plenty of water may be applied through the summer. Except where otherwise stated, the under-mentioned species are shrubs, and require stove treatment.

P. Benthamianum (Bentham's).* *fl.* of a beautiful dark purple, almost white in the centre, about 2in. across; panicles terminal, glanduloso-pilose. Autumn. *l.* oblong-lanceolate, rounded or somewhat cordate at the base, acute, nine-nerved, entire, the upper surface rough with small setæ, the lower covered with adpressed, silky hairs. *h.* 4ft. Organ Mountains, 1841. (B. M. 4007.)

P. elegans (elegant).* *fl.* rich blue, large, produced in abundance during May and June. *l.* opposite, ovate-acuminate, bright shining green. *h.* 5ft. Organ Mountains, 1844. (B. M. 4262.)

P. Gaudichaudianum (Gaudichaud's). *fl.* rosy-purple, in terminal panicles. Summer. *l.* petiolate, ovate, acuminate, beset with small, softish bristles. Branches tetragonal, rough from small, adpressed bristles. *h.* 2ft. to 3ft. Brazil, 1836. SYNS. *Lasiandra petiolata* (B. M. 3766), *Pleionema Gaudichaudiana*, *Rhexia petiolata*, and *R. petiolaris*.

P. Gayanum (Gay's).* *fl.* white, in terminal panicles. Late autumn. *l.* ovate-oblong, acute, serrate, hairy. *h.* 1ft. to 2ft. Peru, 1874. Herb. (B. M. 6345.)

P. granulosum (granulose). *fl.* reddish-purple, very showy, almost 3in. in diameter; corolla concave, rotate; petals obovate-oblong, acuminate, shortly apiculate; panicles terminal, with decussate branchlets. *l.* coriaceous, decussately opposite, entire, attenuated at both ends, five-nerved; petioles much shorter than the leaves. *h.* 10ft. Brazil. (B. R. 671.) SYN. *Lasiandra Fontanesiana* (R. G. 1865, 466).

P. heteromallum (one-woolly-sided). *fl.*, petals purplish-violet five or six, obcordate; calyx pubescent, with deciduous teeth; filaments short, conniving. July to September. *l.* oval-cordate, stalked, beset with flocky wool beneath. *h.* 4ft. to 6ft. Brazil, 1819. SYN. *Melastoma heteromalla* (B. M. 2337; B. R. 664).

P. holosericeum (silky). *fl.* purple; thyrse panicled, terminal, with the rachis very villous and compressed; calyx tubular. July. *l.* sessile, ovate, five to seven-nerved, entire, densely silky-villous on both surfaces. Branches tetragonal, clothed with adpressed bristles. *h.* 6ft. to 10ft. Brazil, 1816. A beautiful species. SYNS. *Lasiandra argentea*, *Rhexia holosericea* (B. R. 323; L. B. C. 236).

P. Kunthianum (Kunth's). A synonym of *P. semidecandrum*.

P. macranthum (large-flowered).* *fl.* rich deep violet-purple, about 5in. in diameter, solitary, freely produced at the ends of the branchlets. Winter. *l.* ovate or oblong-ovate, acuminate, rugose. Branches slender, terete. Brazil, 1864. A very beautiful plant, flowering the more profusely when in a large state, and forming one of the most effective subjects for greenhouse or conservatory decoration. It is best suited for trellises or walls, and, for this purpose, should be planted out, or placed in large tubs or boxes, after the first year's growth. (B. M. 5721.) SYN. *Lasiandra macrantha*.

P. m. floribundum (floriferous). *fl.* of a rich and brilliant violet-blue, produced almost throughout the year, and measuring nearly 1½ft. in circumference. St. Catherine's, Brazil, 1870. A most beautiful variety, producing its gigantic flowers on young plants when only about 3in. in height. It is better suited for pot culture than the type.

P. sarmentosum (twiggy).* *fl.* deep violet or violet-purple, upwards of 2in. in diameter, and disposed in trichotomous panicles. *l.* ovate or ovate-oblong, shortly stalked. Branches sarmentose. *h.* 1ft. to 2ft. Cool valleys of Peru, 1867. A beautiful, greenhouse, sub-shrubby plant. (B. M. 5629.)

P. semidecandrum (five-stamened). *fl.* purple; petals very obtuse; calyx tube campanulate, rigidly setose; pedicels hispid, axillary, one-flowered, and terminal. July. *l.* petiolate, oblong, acute, five-nerved, entire, setuloso-scabrous above, villous beneath. Branches tetragonal, and, as well as the petioles, villous. Brazil. SYN. *P. Kunthianum* (B. M. 4412).

P. villosum (villous). *fl.* rosy-pink, terminal, few, pedunculate; petals obovate, retuse, mucronate. May and June. *l.* ovate, acute, entire, villous, five-nerved. Branches terete, villous beneath. *h.* 3ft. to 4ft. 1820. SYN. *Melastoma villosum* (B. M. 2630; L. B. C. 853).

P. vimineum (twiggy). *fl.* purple; calyx covered with glandular hairs, the segments lanceolate and mucronate. July and August. *l.* ovate-lanceolate, acute, petiolate, and, as well as the branches, scabrous, but canescent beneath. *h.* 6ft. Brazil, 1821. SYN. *Rhexia viminea* (B. R. 664).

PLEURANDRA (of Labillardière). Included under **Hibbertia** (which *see*).

PLEURANTHE. A synonym of **Protea** (which *see*).

PLEURIDIUM. Included under **Polypodium** (which *see*).

PLEUROGRAMME. Included under **Monogramme** (which *see*).

PLEUROGYNE (from *pleuron*, a side, and *gyne*, the female organ; referring to the stigmas issuing from the side of the seed-vessel). SYN. *Lomatogonium*. ORD. *Gentianeæ*. A small genus (three species) of slender, annual herbs, natives of the mountains of Eastern and Arctic Europe, Asia, and North America. Corolla wheel-shaped, fringed at the throat. Leaves opposite. The species are probably lost to cultivation.

PLEUROPETALUM (from *pleuron*, a side, and *petalon*, a petal; in allusion to the shape of the corolla). SYN. *Allochlamys*. ORD. *Amarantaceæ*. A genus comprising only a couple of species of slightly-branched, stove, glabrous shrubs, natives of Mexico, Ecuador, and the Galapagos Islands. Flowers greenish, at length red, small, disposed in terminal, branched panicles, sessile or pedicellate; perianth of equal, oblong, obtuse, concave segments; stamens five to eight. Leaves alternate, rather large, membranous, elliptic-lanceolate, long-acuminate, entire or with slightly undulated margins, narrowed into a rather long petiole. Only one of the species has been introduced to our gardens. It requires culture similar to **Codiæum** (which *see*).

P. costaricense (Costa Rica). *fl.* green, at length scarlet, small, very numerous, in terminal and axillary, sub-corymbose, much-branched panicles, shortly pedicellate; perianth segments five. Autumn. *l.* petioled, alternate, 4in. to 5in. long, elliptic-lanceolate, acuminate, with the tip often drawn out; margin even, or obscurely undulate. Central America and Mexico, 1883. A small shrub, with green branches. (B. M. 6674.) SYN. *Melanocarpum Sprucei*.

PLEUROSPERMUM (from *pleuron*, a side, and *sperma*, seed; in allusion to the size of the fruit ridges). SYNS. *Aulacospermum*, *Hymenolæna*, *Physospermum*. ORD. *Umbelliferæ*. A genus comprising about fifteen species of hardy, tall or dwarf, glabrous, biennial or perennial herbs; three are natives of mostly Eastern Europe and Russian Asia, and the rest are all Himalayan. Flowers white or dark purple; petals obovate or cuneate, rather large for the order; bracts of the involucres and involucels indefinite, sometimes coloured; umbels compound, many-rayed. Leaves pinnate or pinnately decompound; segments ovate, toothed, incised, or cut into narrow laciniæ. Only one species calls for description here. It thrives in any common soil, and may be readily increased by seeds, or by divisions.

P. austriacum (Austrian). *fl.* white; involucre many-leaved. Summer. *l.* bipinnatisect; the segments pinnatifidly cut into acute lobes. Stem fistular. *h.* 2ft. to 3ft. South Europe, 1597. Perennial. (A. F. P. 43; J. F. A. 151.)

PLEUROTHALLIS (from *pleuron*, a side, and *thallo*, to blossom; in allusion to the inflorescence). SYN. *Humboldtia*. Including *Centranthera*, *Rhyncopera*, and *Specklinia*. ORD. *Orchideæ*. A vast genus (nearly 350 species have been described) of stove orchids, of variable habit, natives of the West Indies and tropical America. Flowers small, sometimes very small, in a few species mediocre or rather large, often secund, in bundle-flowered racemes; sepals erect, connivent or somewhat spreading; petals shorter or narrower; pollinia two; labellum usually articulated at the base of the column. Stems filiform, one-leaved, often sheathed. The species have scarcely any ornamental value, but are curious and interesting from a botanical point of view. A selection from those best known to cultivation is given below. They may be grown either in baskets or pans, suspended from the roof of a cool house, most of them thriving along with the Masdevallias. The small ones, such as *P. Grobyi*, are best fastened to little tufts of peat or to Fern stems.

Pleurothallis—*continued*.

P. atropurpurea (dark purple). *fl.* dark purple, solitary; bud ½in. long; petals oblique, three-cusped; lip obtuse, sagittate, crested in the middle. *l.* oblong, narrowed at base, almost equalling the stem; sheaths ventricose. *h.* 6in. Jamaica, 1838. (B. M. 4164, under name of *Masdevallia fenestrata*.)

P. aviceps (bird's-head). *fl.* green, with yellow petals and lip, resembling the beak of a bird. *l.* numerous, oblong-lanceolate. Brazil, 1871. A pretty little plant, of tufted habit.

P. Barberiana (Barber's). *fl.* few, on a slender peduncle, four or five times as long as the leaves; sepals light ochre, blotched with dark purple, aristate, free, ciliated; petals whitish, smaller, serrate; lip cuneate, oblong-clavate. *l.* very small, elliptical, acute, thick, keeled beneath. Tropical America, 1881. A small but pretty orchid.

P. bicarinata (two-keeled). *fl.* dull greenish-yellow, in a few-flowered raceme; sepals aristate, the upper one bifid and bicarinate; petals oblong, minutely serrulate; lip obovate, fleshy, cordate. *l.* oblong, 5in. long, 1⅜in. broad; sheath on stem 1½in. long. *h.* 6in. Brazil. (B. M. 4142.)

P. bilamellata (two-ridged). *fl.* cinnabar-red, two or three at the base of a leaf, minute. Rhizome creeping, bearing numerous stems, each terminating in one cuneate-ligulate, very thick, fleshy leaf. Mexico, 1870. (Ref. B. 95.)

P. fulgens (brilliant). *fl.* brilliant cinnabar-red, one to three on a peduncle ¼in. long; petals washed with greenish-purple; lip of a paler cinnabar. *l.* spathulate-obovate, minutely tridentate at the apex. Stems very short. Costa Rica, 1875. This species is of densely tufted habit.

P. Grobyi (Groby's). *fl.* yellow, streaked with crimson, small, about a dozen in a loose, zigzag raceme; sepals costate, acute, the upper one bidentate; petals membranous, acute; lip fleshy, oblong, obtuse. *l.* obovate, emarginate, petiolate, forming small, dark green tufts. *h.* 3in. Brazil, 1834. (B. M. 3682.)

P. Lanceana (Lance's). *fl.* yellow, crimson at the base inside, in a pendulous spike; sepals linear-lanceolate, the upper one bidentate; petals setaceo-acuminate, fimbriate; lip unguiculate. *l.* fleshy, broadly oblong. *h.* 6in. Surinam, 1831. (L. B. C. 1767.)

P. picta (painted). *fl.* yellow, striped with crimson, in a nearly straight raceme; sepals smaller than in *P. Grobyi* (which this species closely resembles). *l.* narrow-spathulate, longer than the peduncle, and overtopping the lowest flowers. Demerara, Surinam, &c. (B. R. 1825.)

P. prolifera (proliferous). *fl.* deep purple; sepals slightly scabrous; petals pale, linear-lanceolate, serrated upwards; lip oval, fimbriate at base. *h.* 6in. Brazil, 1826. "The formation of leaves, in place of flowers, which gave rise to the specific name, occurs occasionally in many other species" (Lindley). (B. M. 3261; B. R. 1298; L. B. C. 1908.)

P. Reymondii (Reymond's). *fl.*, sepals orange, brown, and green, pubescent, oblong, the dorsal ones larger; petals two-lobed, one rounded, the other elongated; lip minute. *l.* coriaceous, linear-lanceolate, obtuse, acuminated, shorter than the stem. *h.* 6in. Venezuela, &c., 1863. (B. M. 5385.)

P. saurocephala (lizard-headed). *fl.* yellowish-green, changing to light brown, closely dotted with purple inside, disposed in an erect, imbricated spike; dorsal sepal twice as broad as the upper ones. *l.* 4in. long, 2in. broad, coriaceous, broadly oblong, equalling the angular stem. Brazil, 1829. (B. M. 3030; B. R. 1968; L. B. C. 1571.)

P. scapha (skiff). *fl.* yellowish-white, marked with purple lines, except the lower sepals, which are wholly dark brownish-purple; racemes lax, many-flowered. *l.* ovate, coriaceous. 1874. A fine species. (G. C. n. s., xv. 784.)

P. spectrilinguis (tongue like). *fl.* hyaline, disposed in sub-corymbose racemes; sepals spotted with mauve-purple, aristate; lip dark olive-brown, with basilar, retrorse horns, and an elliptic, fringed blade. *l.* narrow-spathulate, about 1in. long. 1883. A small species.

P. strupifolia (strap-leaved). *fl.* in racemes, 3in. to 4in. long, with loose, funnel-shaped, spreading bracts; dorsal sepal, petals, and lip, white, spotted and striped with purple; front sepal all purple-speckled. *l.* resembling long straps, 1½ft. long, sometimes broader and shorter. *h.* 1½ft. Mexico, 1838. (B. M. 3897, under name of *P. picta*.)

PLICATE. The same as **Plaited** (which *see*).

PLOCAMA (from *plokamos*, bent hairs; alluding to the pendulous branches). SYNS. *Bartlingia*, *Placodium*, *Placoma*. ORD. *Rubiaceæ*. A monotypic genus. The species is a greenhouse, erect shrub, with very slender, pendulous branches. A compost of loam and peat is most suitable for its culture. It may be increased readily by cuttings, which will root in sand, under a glass.

P. pendula (pendulous-branched). *fl.* white, minute, axillary and terminal; calyx with a globose tube, and a five-toothed, persistent limb; corolla infundibular-campanulate, with a short tube and a limb of five to seven oblong-lanceolate, valvate lobes. *l.* opposite, or in whorls of four, linear-oblong, filiform, acute, flaccid; stipules connate with the petioles. *h.* 2ft. Canary Islands, 1772.

PLOCOGLOTTIS (from *plokos*, a fold, and *glotta*, a tongue; referring to a fold in the lip). ORD. *Orchideæ*. A genus comprising eight species of stove, terrestrial orchids, with the habit of *Eulophia*, natives of the Malayan Archipelago. Flowers mediocre, shortly pedicellate, racemose; sepals connate beneath the lip, larger than the petals, which are curved at the apex; lip connate with the column on either side by inflexed, membranous folds, its limb being convex, undivided, patent, at first erect; column free above; anthers two-celled; pollinia four, round, with two long, replicate caudicles; peduncles or scapes leafless. Leaves ample, membranous, plicate. Stem or rhizomes creeping, one or many-leaved, not distinctly pseudo-bulbous at base. For culture of *P. Lowii*, the only species introduced, *see* **Cyrtopodium.**

P. Lowii (Low's). *fl.* ochre-coloured, spotted with brown, borne in a spike on a long, hairy scape. *l.* cuneate-oblong. Pseudobulbs obpyriform. Borneo, 1865. (R. X. O. 154.)

PLOCOSTEMMA. Included under *Hoya*.

PLŒSLIA. A synonym of *Boswellia*.

PLOUGHMAN'S SPIKENARD. *See* **Baccharis.**

PLUCHEA (so called after N. A. Pluche, who published the "Spectacle de la Nature," at Paris, in 1732). Marsh Fleabane. SYNS. *Conyza* (in part), *Gymnema* (of Rafinesque), *Leptogyne*, *Stylimnus*. Including *Karelinia*. ORD. *Compositæ*. A genus comprising nearly thirty species of greenhouse, tomentose, villous, or sometimes glutinous shrubs or sub-shrubs, rarely hardy perennial herbs, natives of the warmer regions of America, Africa, Asia, and Australia. Flower-heads white, yellow, or lilac, heterogamous, in the typical species small, disposed in corymbose, leafless, terminal cymes; in a few species, larger and solitary at the apices of the branches, or rather large and crowded at the tips of leafless branches; involucre ovoid, broadly campanulate or subhemispherical, the bracts few or many-seriate; receptacle flat, naked; achenes glabrous or pilose. Leaves alternate, toothed, or rarely entire or pinnatifid. Few of the species are of any horticultural value. *P. caspica* is of very easy culture in the open border, and may be propagated by seeds, or by divisions.

P. caspica (Caspian). *fl.-heads* purple, cylindrical, terminal, corymbose. August. *l.* oblong, lanceolate, entire. *h.* 2ft. to 3ft. Borders of Caspian Sea and Siberia. Hardy, herbaceous perennial. SYN. *Karelinia caspia*.

PLUM. The origin of many of our cultivated Plums is quite unknown; several of them, no doubt, have sprung from *Prunus domestica*, but, in all probability, other wild types have contributed. According to some authorities, the Sloe, or Blackthorn (*P. spinosa*), the Bullace (*P. insititia*), and the Wild Plum (*P. domestica*) are merely sub-species, and are united into one species under the name of *P. communis*, which is found in a wild state throughout Europe and West Africa. "The Sloe is confined to Europe, the Bullace extends to North Africa and the Himalaya" (Hooker). The Plum is a deciduous tree, attaining a height of from 15ft. to 20ft., and forming a moderately spreading head. From the amount of information which is at command regarding Plums, it would seem that various sorts were introduced into this country from France and Italy during the fifteenth century. The fruit has, therefore, been grown from a remote period, and the date when its cultivation first began is very uncertain. Plums are the hardiest of stone-fruits, and the crop is one of the most remunerative, in all favourable seasons, from market gardens and cultivated orchards. In private establishments, the fruits of all the best varieties are much valued for dessert, and those of the coarser and less highly-flavoured ones prove invaluable for cooking and preserving. For the latter purpose, hundreds of tons of the fruit are, in a favourable season, sent from the surrounding market gardens to London alone. The crop

Plum—*continued.*

is therefore one of the most important, both for market and for private consumption. A fruiting branch is represented at Fig. 204.

Propagation. Budding and grafting are the chief methods by which varieties of Plums are propagated. Young trees may also be readily raised from seeds, and from suckers. Suckers are only occasionally used, and should never be employed as stocks. The Plum is naturally inclined to spread its roots, and throw up numerous suckers; and, if these are replanted, or used as stocks, the tendency to be constantly throwing up other shoots from the base is afterwards apparent. Some sorts reproduce themselves nearly true from seeds, as, for instance, the Green Gage; but seedlings generally vary more or less from the original, and it is, therefore, best not to depend on this mode of propagation beyond the raising of seedlings as stocks, except, perhaps, with Damsons, which may be raised from the stones. Plum stocks are required in large numbers for Peaches, Nectarines, and Apricots, as well as for Plums. The seeds

FIG. 204. FRUITING BRANCH OF PLUM.

may be sown when taken from the fruit; or they may be stratified, and sown in autumn or early spring. In the autumn following, the stocks will be ready for transplanting into nursery lines, preparatory to budding or grafting when large enough. For Plum stocks, the varieties best suited are the Damson, Mussel, St. Julien, and White Pear. The Mussel answers well as a stock for standard trees. Shield-budding in July and August, and ordinary cleft-grafting in March, or just before the sap ceases to flow in September, are the most successful methods to adopt. In budding, it is most important that wood, and not blossom, buds be inserted; and, in grafting, wood-buds, which are sometimes very scarce on scions, must be carefully preserved. Stocks for grafting must be prepared by being headed-down early in the year, before growth begins; and the scions should be cut at the same time, or even earlier, and laid with their ends in the ground. Attention must specially be given to this particular, or a successful union of the parts at grafting-time will be out of the question. Standard Plums may be worked near the ground, and the scion allowed to make its own stem, or at the proper height,

Plum—*continued.*

according as the variety may be a vigorous or a weak-growing one. New varieties are raised from seeds.

Soil and Situation. Plum-trees succeed in any fairly good loamy soil, provided the subsoil is open and properly drained. The ground should be well trenched previous to planting, although the roots of Plums are naturally disposed nearer to the surface than those of Apples and Pears. In a very rich soil, the growths usually made are too vigorous to become well ripened; in that which is moderately light, yet sufficiently moist, the trees succeed and produce the best-flavoured fruits. Respecting flavour, however, much depends on the amount of sunshine and light available. In market gardens, where the trees under notice are very extensively grown, they are planted in lines ranging from 15ft. to 20ft. apart, and the intervening spaces are occupied with Gooseberries and Currants. Standards and half-standards are generally favoured; but dwarf and bush-trees are also extensively planted in market as well as in private gardens. All the finer dessert sorts should, if possible, be favoured with wall space in private establishments, as their fruits are invariably of so much importance, and the crop is more certain with the protection of a wall than when the trees are fully exposed. A temporary covering, while the blossoms are open, may also be readily applied, should frost or unfavourable weather prevail. In a southern aspect, the fruits attain their highest flavour; but this position is usually required for Peaches and other trees that are less hardy than Plums, and the latter are relegated to the walls with an eastern or western exposure—positions in which they succeed admirably. As already noted, the roots of Plum-trees run near the surface, and especially is this the case when the soil is left undug. All the available border space is invariably required for numerous crops; and if a width of about 2ft. or 3ft. is left untouched next the wall, the other portion may be dug and cropped annually. The digging-over of this portion should not, however, be left longer than one season without being attended to, or the young roots will ascend, and the work cannot be performed without cutting them off.

Pruning, Training, &c. For Plum-trees against walls, the fan method of training is the best, as one or other of the branches is liable to die off occasionally, and its place can be more readily occupied by those next situated than would be possible with another method, as, for instance, horizontal training. For the open ground, standards, half-standards, pyramids, and bush trees, are available, as already stated. Mr. Rivers states that "Plums form most fertile oblique cordons; no matter how the shoots are pinched, they will produce large crops of remarkably fine fruit, and continue to bear in spite of excessive pinching, forming cylinders of fruit; their worst tendency is to excessive growth, which must be checked by root-pruning." Plums are admirably adapted for culture in pots: late sorts, which can only be ripened with difficulty outside, arrive at great perfection under glass. *See* **Orchard House.** The fruit of the Plum is produced on small spurs, which form in great quantities on the ends and along the sides of bearing shoots of from one to three years' growth—that is, supposing they are well ripened. In pruning, therefore, these spurs should be carefully preserved, and also a sufficient quantity of young wood kept annually to replace any which becomes old and unfruitful. The main branches on a fan-trained tree should be allowed plenty of space, and any irregular or misplaced ones removed, after provision can be made for filling their places with others of a better description. Summer pruning consists in shortening back the young shoots, treating the upper part of the tree first, to encourage the production of blossom-buds on the short spurs left. At the winter pruning, weak and unripened wood form the chief parts to be cut away. If Plum-trees become unfruitful, because of vigorous wood-

Plum—*continued.*

growth, they should be lifted early in autumn, and root-pruned. It has been recommended that pyramid trees should be lifted and replanted, if necessary, every two years; this operation gives them a proper check, and greatly increases their fertility. Standard Plum-trees in the open ground, when once they are properly started, require but little pruning or training, unless the heads become too much crowded, when the weak wood should be cut out. If vigorous shoots appear, as they often will, in the centre of a young tree, they should be pinched at an early stage, in order to check the sap. Such shoots seldom ripen properly on any fruit-tree, and their production should not be encouraged. Sometimes excessive vigour may be materially checked by simply clipping off a quantity of the leaves, on shoots so disposed, across the centre, with a view to arresting the flow of sap to the leaves, and thus indirectly affecting its progress to unduly enlarge the shoot.

Plums intended for dessert should be allowed to hang until they are nearly ready to drop from the tree; when only required for cooking, it is not of so much importance. The bloom on choice fruits should be carefully preserved, by handling only the stem when gathering them, and placing single layers in a shallow basket or box for transmitting to a cool fruit-room. Fruits with their bloom uninjured by rubbing are better able to withstand atmospheric changes than are those roughly handled, the bloom being their natural protection. Some few sorts, amongst which Coe's Golden Drop is a well-known example, will keep good for dessert a long time after being gathered, if wrapped in paper, and stood in a dry, airy place: these fruits attain their highest flavour when they become partially shrivelled. Plums and Damsons for cooking may be sent, before they get too ripe, very long distances, by being packed closely in a box, with a little soft chaff shaken in to fill up interstices between them. That cut from Oat straw is the best.

Sorts. The following list includes most of the best varieties of Plums, both for dessert and kitchen use, which ripen from the early until the latter part of the season. There are many others in cultivation which it is thought unnecessary to refer to here, but it is not unlikely that some are omitted which should have had their merits recognised. Plenty are, however, enumerated for all purposes.

Angelina Burdett. Fruit round, of medium size; skin dark purple, thickly covered with brown spots and a blue bloom; flesh very rich and juicy. A good dessert Plum, which ripens early in September, and may be kept until it shrivels, when the flavour is very rich.

Autumn Compôte (Rivers'). Fruit oval, very large, bright red, and handsome, of first-rate quality for preserving. End of September. A valuable, late culinary variety.

Belgian Purple. Fruit medium or large, roundish, deep purple flesh juicy and richly flavoured. Middle of August. Dessert or kitchen.

Belle de Septembre. Fruit large and handsome, roundish-oval, reddish-purple, covered with yellow spots and a thin bloom. Early in October. An excellent kitchen sort. The tree is an enormous bearer.

Blue Impératrice. Fruit medium, roundish-ovate, deep purple, with thick, blue bloom; flesh rich, but not very juicy. October. An excellent variety for preserving and for dessert; when allowed to hang, the fruits become very richly flavoured. The tree is an excellent bearer; it should be grown against a wall.

Bryanston Gage. Fruit large, round, green, blotched with red; flesh juicy and rich. September. A large and excellent variety of GREEN GAGE, which ripens about a fortnight later than the last-named. Dessert.

Coe's Golden Drop. Fruit very large, oval, pale yellow, with numerous dark red spots; flesh juicy, rich, and most delicious when well ripened. End of September. One of the finest late Plums for dessert or preserving. The tree deserves a wall, but bears well in the open; it is also well adapted for pot culture.

Cooper's Large. Fruit medium or large, oval, dark purple next the sun, with numerous brown dots; flesh juicy, and of rich flavour. End of September and beginning of October. Dessert

Plum—*continued.*

De Montfort. Fruit medium sized, roundish, dark purple, with thin, blue bloom; flesh juicy, rich, and excellent, particularly when the fruit shrivels. Middle of August. A first-rate dessert Plum which resembles ROYAL HÂTIVE, but the fruits are larger.

Denniston's Superb. Fruit rather large, nearly round, greenish-yellow, marked with a few blotches, and covered with bloom; flesh juicy, rich, and deliciously flavoured. Middle of August. Dessert. The tree is very hardy, and a great bearer.

Diamond. Fruit very large, oval, deep purple; flesh juicy, and briskly flavoured. Middle of September. One of the finest culinary Plums known. Tree vigorous, and an excellent bearer.

Early Favourite (Rivers'). Fruit medium, roundish-oval, dark purple, covered with a thin bloom; flesh juicy, and of excellent flavour. Middle of July. Mr. Rivers states, in his catalogue, that it "requires a wall with south or south-west aspect, and is then the earliest of all early Plums."

Early Rivers (Rivers'). Fruit oval, medium sized, deep purple; flesh juicy, sweet, and brisk. End of July. A good, early Plum, and a great bearer; valuable for preserving, because the fruits, though not large, are unusually heavy. This variety is also sometimes called EARLY PROLIFIC.

Goliath. Fruit very large, oblong, reddish-purple. End of August. A large, showy Plum, best suited for culinary purposes and preserving.

Grand Duke (Rivers'). Fruit very large, purple, with blue bloom. Middle of October. Kitchen. A seedling raised by Mr. Rivers from AUTUMN COMPÔTE; a valuable addition to late varieties, either for market or private gardens.

FIG. 205. FRUITING BRANCH OF GREEN GAGE PLUM.

Green Gage. Fruit round, medium sized, yellowish-green, marked, when ripe, with faint crimson spots, and covered with a grey bloom; flesh tender, melting, and of a most delicious flavour. End of August. Well known as being one of the richest-flavoured of all Plums, invaluable for dessert, and amongst the very best for preserving. The tree is hardy, and an excellent bearer; it produces the largest fruits on a wall, but the most richly-flavoured ones are generally those from standards grown in the open ground. See Fig. 205.

Guthrie's Late Green. Fruit large, round, yellowish-green, covered with a thin bloom; flesh yellow, firm, and very rich. Middle and end of September. A valuable late dessert Plum. The tree is hardy, and very productive.

Hulings' Superb. Fruit very large, roundish-oval, yellow; flesh rich, sugary, and highly flavoured. End of August. A fine large dessert Plum.

Ickworth Impératrice. Fruit medium or large, purple; flesh tender, juicy, and of rich flavour. October. An excellent late dessert variety; the fruits, if allowed to hang until they shrivel, attain a high flavour; after being gathered, they may be kept for a long time in a dry place, if wrapped in soft paper.

Impériale de Milan. Fruit large, oval, dark purple, dotted with yellow; flesh yellowish, juicy, and rich. Beginning of October. Good for dessert and preserving; late.

Jefferson. Fruit large, oval, yellow, mottled with red; flesh firm, juicy, and deliciously flavoured. Beginning of September. One of the finest dessert Plums. The tree is an abundant bearer.

July Green Gage. Fruit similar in size and shape to the GREEN GAGE; it is also of equally good quality, and may be considered a very valuable early variety. End of July.

Plum—*continued.*

Kirke's. Fruit medium, round, dark purple, covered with a dense, blue bloom; flesh firm, juicy, very richly flavoured. Middle of September. A delicious dessert Plum, one of the best. The tree is very hardy and productive.

Late Green Gage. Fruit smaller than the GREEN GAGE, round, greenish-yellow; flavour rich and good. A good late dessert Plum, which ripens at the beginning of October.

Late Rivers. Fruit medium or small, round, dark purple, almost black; flesh yellow, of very fine flavour. End of October and beginning of November. A valuable, extremely late variety, raised by Mr. Rivers.

Lawrence's Favourite. Fruit large, round, dull yellowish-green, covered with grey bloom; flesh tender, juicy, and rich. Beginning of September. Dessert. The tree is a free grower and bearer; it forms a beautiful pyramid.

McLaughlin's. Fruit large, yellow, mottled with red, and covered with a thin bloom; flesh firm, sweet, very juicy and rich. Middle and end of August. A large and delicious dessert Plum of the GREEN GAGE race.

Mirabelle. Fruit very small, oval, yellow, covered with a light bloom, and marked with reddish spots next the sun; flesh deep yellow, firm, briskly flavoured. Middle of August. Valuable for preserving and culinary purposes. The tree often bears its fruit in clusters; it forms a beautiful pyramid, and is well adapted for pot culture.

Mitchelson's. Fruit medium-sized, oval, deep purple, almost black, covered with a thin blue bloom. End of August and beginning of September. A fine Plum for cooking and preserving. The tree is a prodigious bearer.

Orleans. Fruit medium, round, dark red or purple when fully ripe; flesh tender, and briskly flavoured. Middle and end of August. An old, well-known, and highly valued culinary sort, excellent for preserving, but only second-rate for dessert. It is an abundant bearer, and does best against a wall. There are also varieties known as the EARLY and LATE ORLEANS, in reference to their season of ripening.

Oullins Golden. Fruit very large, greenish-yellow, dotted with crimson where exposed, and covered with a delicate bloom; flesh very tender, juicy, and delicious. Beginning and middle of August. An excellent and very handsome early dessert Plum. Tree unusually fertile.

Perdrigon Violet Hâtif. Fruit medium, purple, juicy, rich, and excellent. Middle of August. Dessert. Tree very hardy, and bears abundantly.

Pond's Seedling. Fruit very large, oval, bright dark red, with some grey spots, and covered with bluish bloom; flesh juicy and briskly flavoured. Beginning and middle of September. A great bearer, very valuable as a culinary variety.

Prince Engelbert. Fruit very large, oval, deep purple, with a remarkably dense bloom; flesh juicy, with a rich, brisk flavour. End of August, and September. One of the finest culinary Plums, delicious when preserved; it is also good for dessert when highly ripened. The tree is a great bearer.

Prince of Wales. Fruit medium or rather large, round, reddish-purple, with yellow dots and a thick bloom; flesh juicy and sweet. Beginning of September. A good culinary sort. The tree is an abundant bearer.

Purple Gage. Fruit medium, round, purple, with pale blue bloom; flesh firm, and of the most delicious flavour. Beginning and middle of September. A dessert Plum of the greatest excellence; if allowed to ripen and shrivel, the fruit becomes a perfect sweetmeat. Tree hardy and productive; succeeds as a standard, and also against a wall.

Red Magnum Bonum. Fruit very large, oval, deep red; flesh firm, and briskly-flavoured. Middle of September. A very old culinary variety; it succeeds well as a standard.

Reine Claude de Bavay. Fruit large, round, greenish-yellow, mottled with green, and covered with a delicate bloom; flesh tender, rich, and sugary. End of September and beginning of October. Dessert. A large, valuable variety of the GREEN GAGE race.

Royale de Tours. Fruit large, light purple, with small, yellow dots and blue bloom; flesh very juicy, and of rich flavour. Middle of August. Excellent either for dessert or preserving.

Royale Hâtive. Fruit medium-sized, round, light purple, with blue bloom; flesh yellow, melting, exceedingly rich. End of July. A good early dessert Plum.

Sultan (Rivers'). Fruit medium or large, round, deep red, with a thick bloom; flavour brisk and pleasant. Middle of August. A very productive and excellent culinary Plum, raised by Mr. Rivers from BELLE DE SEPTEMBRE.

The Czar (Rivers'). Fruit very large, oval, dark purple, almost black when ripe; flesh tender, juicy, and agreeably flavoured. End of July and beginning of August. A very valuable early culinary Plum, raised by Mr. Rivers from PRINCE ENGELBERT, fertilised by another variety. The tree is hardy, robust, and very productive, and the fruits are not liable to crack with the rain.

Transparent Gage. Fruit large, round, much flattened, greenish-yellow, marbled with red; flesh transparent, rich, juicy, and

Plum—*continued.*

of high excellence. Beginning and middle of September. One of the most delicious Plums for dessert, and considered the finest of the Gage tribe. Two seedlings have been raised by Mr. Rivers from this variety, and named EARLY TRANSPARENT and LATE TRANSPARENT GAGE. The first-named is said to ripen ten days before, and the other ten days after, the typical sort. "The two seedlings and the parent differ entirely in their growth, but are almost identical in the quality and size of the fruit. The EARLY TRANSPARENT is upright and compact, but vigorous; the LATE TRANSPARENT is dwarf and compressed" (Rivers).

Victoria. Fruit large, roundish-oval, bright red, covered with a thin bloom; flesh very juicy and sweet. September. A well-known and first-rate culinary Plum, very extensively cultivated in market gardens, and worthy of a place in every collection. The tree is a most abundant bearer, both as a standard and against a wall.

Washington. Fruit large and handsome, deep yellow when ripe, marked with crimson, and covered with pale bluish bloom; flesh firm, rich, and sugary. Middle of September. One of the best culinary Plums, also sometimes used for dessert.

White Magnum Bonum. Fruit very large, oval, deep yellow, with thin, white bloom; flesh firm, rather coarse, sub-acid. September. A very large and valuable variety for cooking and preserving; it is usually known as the EGG PLUM. The tree is vigorous, and generally bears well.

Winesour. Fruit rather small, oval, dark purple; flesh juicy, sub-acid. Middle of September. A very valuable variety for preserving and for culinary purposes; much esteemed in some districts, but not so good in others.

Woolston Black. Fruit medium, round, deep purple, with blue bloom; flesh melting and richly flavoured, particularly after becoming shrivelled. Beginning of September. Dessert.

Of the Bullace (*Prunus insititia*) there are several varieties. The species grows wild in many parts of Britain, and the fruits are much like Damsons, except that they are round, instead of being oval. They are used for cooking and preserving. The sorts best known are named respectively BLACK, ESSEX, ROYAL, and WHITE. The trees are usually enormous bearers. Amongst Damsons the following are recommended:

Common. Fruit small, roundish-oval, dark purple or nearly black. Middle and end of September. A well-known variety, much esteemed for preserving.

Crittenden's, or Cluster. Fruit larger than other varieties of Damson, roundish-oval, black, with a thin bloom. Middle of September. This is considered the best sort of Damson; it was raised in Kent, and has recently been brought into prominent notice because of its extraordinary fertility. The tree forms a handsome pyramid.

Prune. Fruit oval, larger than the COMMON Damson, and considered better for preserving, but the tree is not generally so productive. September. Much esteemed in the North.

Rivers' Early. A seedling raised by Mr. Rivers from ST. ETIENNE PLUM. Early in August. It is very early, and a valuable addition.

White. Fruit oval, pale yellow, with a thin bloom; flesh yellow, agreeably acid. End of September.

FUNGI. The Fungi parasitic on Plums need not be greatly dilated upon, since few of them do much injury to any part of the tree. A considerable number of *Pyrenomycetes* have been found growing upon the dead branches; but they are not known to be injurious to the living plants, with a few exceptions mentioned below, and even these are scarcely dangerous, except under conditions that specially favour their growth. The leaves are sometimes thinly covered with a white coating, composed of filaments of the nature of those described under **Oidium.** After a time, there become visible, scattered over this coating, small, round, black particles, like grains of gunpowder. These, by the help of the microscope, are seen to be perithecia, in each of which is inclosed a single ascus, and in this lie eight colourless, oblong, very minute spores, which escape by the walls of the perithecium bursting when ripe. The latter body is provided on the top with from three to seven upright, stiff, slender outgrowths, each of which bifurcates four or five times near the tip. This Fungus has received the names *Podosphæra Kunzei*, and *P. tridactyla*. The latter name is now generally adopted. Reproduction is effected both by the spores described above, and by means of conidia, developed as described under **Oidium.**

Plum—*continued.*

Though not uncommon, the Fungus is seldom very hurtful to Plum-trees; but, where desirable to check its growth, this may be effected by dusting the leaves with flowers of sulphur, or by syringing them with a mixture prepared from sulphur and quicklime, as recommended under **Mildew**, or with potassium sulphide solution (*see* **Oidium**).

Another Fungus parasitic on Plums, and named *Exoascus Pruni*, gives rise to a peculiar condition of the fruit, known as "Bladder Plums." The presence of this Fungus is easily recognised by the great increase in the size of the young fruits, as compared with healthy fruits of the same age, by their elongated, pointed form, by the greyish-green bloom on their surface, and by the diseased fruits being hollow, like bladders, with frequently barely a vestige of the seed. After a short time, these enlarged fruits turn to a dirty-yellow colour, fade, and shrivel up. The mycelium of this Fungus lives all the year round in the soft bast of the twigs, which often show distinct traces of its presence. From these it extends into the ovaries of the flowers, along the woody bundles, and thence spreads throughout the tissues, and comes to lie close below the skin of the ovary. Branches grow out from the mycelium, burst through the skin, and stand erect, side by side, over the surface. Each reaches a length of rather over $\frac{1}{100}$in., with a breadth of about a quarter as much, and is supported on an oblong stalk-cell, about one-fourth of its length, which rests on the surface of the epidermis, not pressing between its cells. Each of the longer cells is an ascus, and has inclosed in it eight round spores, which are set free by the bursting of the ascus, about the time the fruit withers. The spores are scattered far and wide by the wind, and such as fall into favourable situations propagate the disease anew. The only remedy likely to prove useful is to cut off, and burn without delay, the fruits and branches that show traces of the Fungus.

The leaves of Plum-trees frequently show thickened, fleshy, orange-red spots, of irregularly-rounded outline, These are the work of a Fungus known as *Polystigma rubrum.* A section through one of these spots will probably pass through one or more flask-shaped spaces, some of which are perithecia, inclosing numerous asci, in each of which are eight minute, oval, colourless spores. Other of the flask-shaped bodies are pycnidia of the same Fungus; and in them lie numerous slender, curved, rod-like, colourless sporidia, each formed on the tip of a small stalk. Both kinds of flasks have the walls inseparable from the surrounding tissues, and both open by narrow mouths on the lower surface of the spots. On examination, with the microscope, of a thin slice from the leaf, the tissues are found crammed with the filaments of the Fungus, and much altered. However, the spots are rarely so numerous as to do much harm to the leaves, though they take nourishment from them, and prevent the proper fulfilment of their functions. This Fungus is widely spread, in Europe, Asia, and North America. Where the Fungus is doing harm to Plum-trees, it will be well to collect and burn the diseased leaves, and also those which have fallen. Sorauer recommends digging the latter into the ground in early spring, before the young leaves burst from the buds, to prevent risk of their being infected. As regards the prevention of diseases of Plum-trees, it is very desirable to remove from their neighbourhood Sloe-bushes and Bird Cherries, since the disease-producing insects and Fungi live on these species as well as on the Plum.

Plums frequently suffer badly from the action of *Oidium fructigenum*, for a full account of which, including remedies, *see* **Pear** (FUNGI). The Fungus sometimes covers the entire surface of the fruits, rendering them quite white, and causing them to dry up.

INSECT PESTS. These are not very hurtful in the

Plum—*continued.*

British Islands except, it may be, in a few cases, under peculiar conditions. The roots are liable to be cut and eaten by Cockchafers, &c. Certain Bark Beetles injure the stems, especially of trees that are not otherwise quite healthy. Some Weevils also feed, as larvæ, in winding galleries below the bark of diseased or weakly trees; among these, one of the more prominent is *Magdalinus Pruni*, a beetle about ⅛in. to ¼in. long, with black body and dull red antennæ.

The branches are attacked at times by Weevils of the genus *Rhynchites*. *R. Alliariæ*, which is perhaps the most injurious species, is from ⅛in. to ¼in. long, and is blue, with coarsely-striated wing-cases, dusky antennæ, and a moderately long beak. The female lays her eggs on the buds near the end of the young shoots, in spring, and then gnaws the branch a little below the tip. The part beyond the notch hangs down and withers, and is thereby rendered suitable for nourishing the larvæ, which usually feed in the pith. This Weevil is at times very hurtful among young trees on the Continent. The perfect insects of this, and of certain allied species, do considerable harm by gnawing the young buds and leaves.

A considerable number of Moths, and one Butterfly, *Aporia Crataegi*, or the Black-veined White (*see* **Hawthorn Caterpillars**), feed, as larvæ, upon Plum leaves; but most of those that call for notice are more hurtful to other trees, and will be found treated of under the following headings: **Lackey Moth, Leaf-rollers, Liparis, Moths, Tortricina,** and **Winter Moths.** The larvæ of certain species of Sawflies also prove destructive by devouring the leaves. The worst of these is *Eriocampa limacina*, the larvæ of which feed on a great variety of cultivated trees and shrubs, and go by the name of Slugworms, because of their form, of their sluggish habits, and of a slimy excretion that covers the body. For an account of these larvæ, and of the means to be used to destroy them, *see* **Slugworms.** The young branches and leaves are invaded, at times, by colonies of Aphides or Green Flies. *Phorodon Humuli*, var. *Mahaleb*, causes the young leaves at the tips of the twigs to become rather fleshy and wrinkled, the insects living in large colonies on their lower surface. *Myzus Persicæ* has very similar habits; and one or two other species are not rare on Plum-trees.

The flowers and fruits are attacked chiefly by the Plum Weevil (*Rhynchites cupreus*) and the Plum Tortrix (*Carpocapsa funebrana*). The larvæ of both these insects bore into the unripe fruit, and, by causing its premature fall, materially injure the crop. The Weevil is rather under ⅛in. long, bronze or coppery in colour, with a thin coating of scattered grey hairs, and a black beak and limbs. The wing-cases are deeply marked with dots or pittings. When the fruit is scarcely half grown, the female lays her eggs on it, and the larvæ penetrate into it. The moth (*Carpocapsa funebrana*) is seldom seen, but it is very common, in the larval state, in unripe Plums. The fore wings are grey, clouded with darker shades; at the hinder angle of each is a spot of ash-grey, with a faint metallic lustre, surrounded by an indistinct border, in which lies a row of black dots. The spread of wings is rather over ½in. The larvæ are reddish above, paler below, with the head brown-black. There are a few soft hairs on the body. The larvæ of both beetle and moth feed in the Plums during early autumn, and, when the fruits fall, the larvæ crawl out, burrow into the ground, and there become pupæ, to emerge as perfect insects in the following spring.

Remedies. For the means to be adopted against insects on the roots, *see* **Cockchafer** and **Mole Cricket**; and for those against Bark Beetles, *see* **Scolytidæ.** The leaf-feeding beetles and larvæ of moths are best got rid of by shaking or jarring the branches over anything laid or held below, and collecting and killing the insects. In some cases, hand-picking is the most satisfactory method The Slugworms or Sawfly larvæ cannot be got rid of by this method, but require special treatment, for which *see* **Slugworms.** Aphides are best combated by the removal of all surplus young twigs, especially if attacked by the Aphides, and by applications syringed upwards below the leaves. *See* **Aphides.** The species that feed in the fruits are best kept under by collecting the prematurely fallen fruits, without delay, and burning them, or giving them to pigs.

Following up the above account of the insect pests on the Plum, it may be mentioned that Mite Galls, of the genus *Phytoptus* (*see* **Mites**), produce galls of two or three kinds on the leaves of the Plum, as well as on the Sloe and the Bird Cherry. Of these, the more conspicuous are *Erineum Padi*, in the form of irregular patches of velvety, close-set hairs, at first pale, but becoming rusty-brown, on the lower surface of the leaf; also outgrowths of a rounded or bullet-like form, and half a line to two lines long, and green or red, scattered over the surface of the leaf (*Cephaloneon molle*), or near the margins (*C. hypocrateriforme* and *C. confluens*). They also, at times, produce small galls in the bark of young branches (*Cecidoptes Pruni*). However, none of these mite-galls seriously affect the welfare of the tree, though rendering it unsightly. If from any cause it seems desirable to check the increase of the galls, hand-picking is the only remedy likely to be of use.

The fruits of the Plum-tree are very much injured, in the United States of America and in Canada, by the larvæ of two kinds of Weevils, both living in the fruit. Though neither has proved hurtful to Plums in England, the habits of the larvæ, and their abode in the fruits, render their introduction not unlikely; hence, the insects and the kind of injury done by them, are here shortly described. The Plum Curculio (*Conotrachelus nenuphar*) is about ¼in. long, small, rough, and blackish, and has on each wing-case, in the middle, a black, shining hump, and behind this a clay-yellow band, variegated with white spots in the middle. The female settles on the young fruit, bores a hole in the skin to receive an egg, drops it in, and then makes a crescent-shaped cut about half round it. She repeats this process on one fruit after another. The larva hatches in a few days, and at once eats into the fruit, till it arrives at the stone, near which it feeds. It reaches its full size in from three to five weeks. The fruit becomes gummy, and falls prematurely and the larva remains, till it is full grown, in the fallen fruit; it then eats its way out, bores into the ground, changes into a pupa, and the perfect insect emerges in from three to six weeks. The beetles hybernate under bark and in other retreats. This insect often destroys a large part of the Plum and Cherry harvest, and it also feeds in other stone fruits. The best remedy is to jar the beetles into an inverted umbrella, or on to sheets spread below the tree, and to collect and destroy the fallen fruits without delay, or to turn pigs into the orchards to feed on them. Rubbish should not be left for shelter to beetles. The second species (*Coccotorus scutellaris*) is popularly called the Plum Gouger. It is very common in the valley of the Mississippi, but has not yet been found in the Eastern States. It is said to be less hurtful than the former species, which is fortunate, as its habits render it the more likely to be brought to Europe. In general appearance, it is somewhat like the Plum Curculio, but differs as follows: It is nearly ¼in. long; the head and wing-cases are brown, with a leaden-grey tint; and the wing-cases are variegated irregularly with black and pale spots, and bear no humps; the thorax and legs are ochre-yellow; and the snout cannot be folded below the breast. The beetles appear in spring. The female bores holes in the young Plums, and pushes an egg into each, but she makes no cuts around them. The larva hatches in a few days, and bores at once to the stone,

Plum—*continued.*

which it pierces while still soft. The larva feeds, till full grown, on the seed, and then bores a hole for its escape as a beetle; but it remains inside the stone, and there becomes a pupa. The beetle emerges usually in August or September, and hybernates in the perfect state. It feeds, in spring, on young Plums, into which it bores its beak. The Plums exude gum, and become knotty and useless. This beetle is also known as *Anthonomus prunicida*. The remedies recommended are jarring the trees, to shake down the beetles, as with the Plum Curculio, and collecting and destroying fallen fruits. The beetles are active, and take flight readily; hence, jarring is less successful than with the former species.

PLUMBAGELLA. Included under **Plumbago** (which *see*).

PLUMBAGINEÆ. A natural order of herbaceous or woody, generally perennial plants, broadly distributed, but, for the most part, abounding in maritime districts and salt lands. Flowers pink, violet, blue, or yellow, rarely white, hermaphrodite, regular, sessile or shortly pedicellate; calyx gamosepalous, tubular or funnel-shaped, sometimes coloured, five, ten, or fifteen-ribbed, the primary ribs produced into teeth or lobes; corolla monopetalous, or of five petals, hypogynous, sometimes shortly connate or coherent, rarely all free at base; stamens five, opposite the petals or corolla lobes. Fruit a capsule or utricle, included in the calyx, or rarely elongated and exserted. Leaves sometimes fascicled at the top of a rhizome, simple, entire, semi-amplexicaul; sometimes shortened into a petiole, dilated at its base, and amplexicaul; sometimes alternate, on a branching stem, with swollen nodes; exstipulate. Certain of the species possess tonic and astringent properties. The Plumbagos contain a caustic colouring matter. Eight genera and scarcely 200 (according to Bentham and Hooker) species are included in this order. Examples are: *Armeria*, *Plumbago*, and *Statice*.

PLUMBAGO (the old Latin name, used by Pliny, from *plumbum*, lead; the plant is said by him to be efficacious in curing the *lead* disease). Leadwort. SYN. *Thela*. Including *Plumbagella*. ORD. *Plumbagineæ*. A genus comprising about half-a-score species of stove, greenhouse, or hardy perennial herbs, sometimes shrubby, rarely annuals (one species leafless), inhabiting the warmer regions of the globe. Flowers blue, rose-colour, violet, or white, spicate at the apices of the branches; calyx tubular, five-fid; corolla salver-shaped, the limb spreading, five-lobed. Leaves usually alternate, auriculate-amplexicaul, or dilated at base into an amplexicaul petiole, or naked and toothed. The tender sorts flower best in a moderately warm house, and are well adapted for growing against a wall. The most suitable compost is one of good fibrous loam and sand, and a little peat. They do very well when planted out in the borders of a warm conservatory, or in a warm greenhouse. Propagated by the rooted shoots from the base of the plants; or by nearly ripe cuttings, which root freely in a gentle bottom heat. The annual species are easily raised from seeds, sown in the open border, in spring. The majority of the species are, or have been, cultivated in our gardens. *P. capensis* is admirably adapted for training up a greenhouse rafter or pillar. It should be cut back hard after flowering, and allowed to rest through the winter by being kept rather dry. The beautiful pale blue flowers are produced in the greatest profusion on the shoots of the current year. This plant also succeeds in a warmer temperature, and, if grown in two or three positions differently affected in this respect, the flowering season collectively may be prolonged by the plants in one house succeeding those in the other. *P. rosea* is a fine winter-flowering plant, requiring more heat than *P. capensis*,

Plumbago—*continued.*

except in the summer. It is adapted for pot culture, or for planting in a stove. The hardy perennial species thrive in ordinary soil, and may be increased by divisions.

P. capensis (Cape of Good Hope).* *fl.* pale blue, disposed in terminal, sub-secund, short, approximating spikes; corolla tube thrice as long as the calyx. Summer and autumn. *l.* oblong or oblong-spathulate, obtuse, mucro-nulate, entire. Stem angularly striate. *h.* 2ft. Cape of Good Hope, 1818. A stove or greenhouse, climbing or decumbent shrub, sometimes employed in bedding. (B. M. 2110; B. R. 417.)

P. cœrulea (blue). *fl.* blue, about ½in. long, disposed in loose, terminal spikes; corolla half as long again as the calyx tube, dilated above. Summer. *l.* ovate-oblong, sub-rhomboid, attenuated and slightly acute at both ends. Stem erect, flexuous, branched. *h.* 1½ft. South America, 1826. Greenhouse annual. (B. M. 2917, under name of *P. rhomboidea*.)

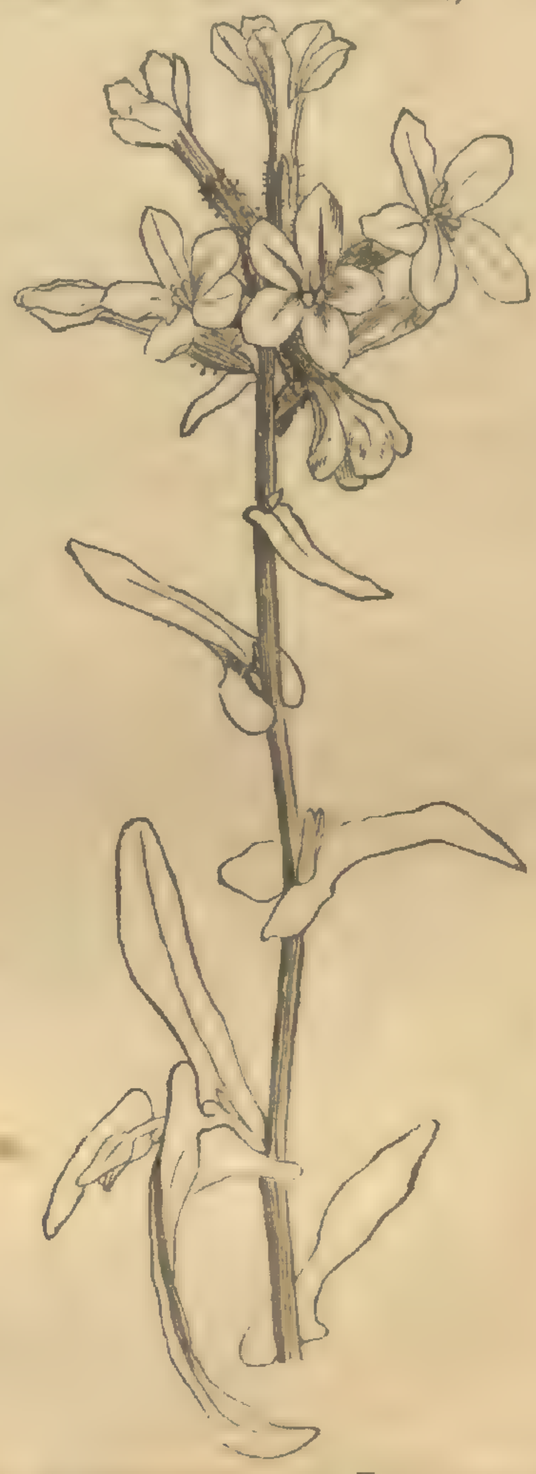

FIG. 206. INFLORESCENCE OF PLUMBAGO EUROPÆA.

P. europæa (European). *fl.* violet-rose, spicate and somewhat headed at the tips of the branches; corolla tube nearly twice as long as the calyx, enlarged above. September. *l.* slightly powdery beneath, slightly gland-toothed at the margin; lowest ones shortly attenuated or sessile; intermediate ones ovate or oblong; uppermost ones lanceolate or linear, acute. Stem erect, much branched. *h.* 3ft. South Europe, 1596. Hardy herbaceous perennial. See Fig. 206. (B. M. 2139; S. F. G. 191.)

P. Larpentæ (Lady Larpent's).* *fl.* violet, in close, terminal heads; sepals and bracts shining, ciliated, destitute of glands. October. *l.* obovate, acute, tapering to the base, minutely scaly, finely serrated, fringed. Stems slender, zigzag, scaly, hairy. *h.* 1ft. Shanghai, 1846. Hardy perennial. (G. C. 1847, 732.) The correct name of this plant is *Ceratostigma plumbaginoides*.

P. micrantha (small-flowered). *fl.* white, disposed in terminal or axillary, shortly pedunculate spikes. July. *l.*, lower ones oblong, slightly toothed, attenuated into very short, amplexicaul petioles; the rest sessile, oblong-lanceolate, acuminate, cordate-auriculate at the base. Stem angular-sulcate, erect, or diffuse and much branched. *h.* 2ft. Siberia, &c., 1829. Hardy annual.

P. occidentalis (Western). A synonym of *P. scandens*.

P. pulchella (pretty). *fl.* bluish-violet, scarcely ½in. long, disposed in loose, terminal, elongated spikes; corolla tube scarcely half as long again as calyx. Summer. *l.* ovate-oblong, acuminate, attenuated at base into very short, amplexicaul petioles. Stem slender, erect, branched, striated. *h.* 2ft. to 3ft. Mexico. Stove sub-shrub. (L. B. C. 1536, under name of *P. rhomboidea*.)

Plumbago—*continued.*

P. rosea (rose).* *fl.* rosy-scarlet, 1½in. to 2in. long, axillary or disposed in long, terminal spikes; calyx slightly-reddish; corolla tube slender, four times as long as the calyx. July. *l.* large, oblong, attenuated and slightly obtuse above, shortly cuneate at base, and attenuated into very short, amplexicaul, exauriculate petioles. Stem erect, terete, slender, striated, simple beneath, branched above. *h.* 2ft. East Indies, 1777. Stove perennial. (B. M. 230.) *coccinea* is a splendid variety, with larger, more brightly-coloured flowers. (B. M. 5363.)

P. scandens (climbing). Devil's Herb; Toothwort. *fl.* white, disposed in loose, terminal, elongated spikes; corolla tube twice as long as the calyx. July. *l.* oblong or oblong-lanceolate, acuminate, on short petioles, amplexicaul at base. Stem somewhat climbing, slender, striated, much branched. *h.* 3ft. West Indies, 1699. Stove shrub. SYN. *P. occidentalis.*

P. zeylanica (Cingalese). *fl.* white, disposed in elongated, rather dense spikes; corolla tube twice as long as the calyx. June. *l.* ovate or oblong, slightly acute, very shortly and abruptly attenuated into an amplexicaul, short petiole. Stem somewhat climbing, angular-striate, much branched. *h.* 1½ft. East Indies, 1731. Stove shrub. (B. R. 1846, 23.)

PLUM, CHERRY. *See* **Prunus cerasifera.**

PLUM, COCOA. *See* **Chrysobalanus Icaco.**

PLUM CURCULIO. *See* remarks on INSECTS under **Plum.**

PLUM, DATE. *See* **Diospyros.**

PLUMERIA (named in honour of Charles Plumier, 1646-1706, a French traveller and writer on botany). SYN. *Himatanthus.* ORD. *Apocynaceæ.* A rather large genus (about forty species have been described) of glabrous or pubescent stove trees, with thickish branches, natives of tropical America. Flowers white, yellowish, or rose-purple, large, in terminal cymes. Leaves alternate, often on long petioles, penniveined. The species thrive best in a compost of sandy loam and fibry peat. Propagated, in spring, by cuttings of ripe shoots, inserted in sand, under a handlight. Very few species are now in cultivation.

FIG. 207. FLOWERING BRANCHLET OF PLUMERIA TRICOLOR.

P. acuminata (acuminate). A synonym of *P. acutifolia.*

P. acutifolia (pointed-leaved).* *fl.* pink outside and white within, very fragrant, in compound, spreading cymes. June to September. *l.* scattered, lanceolate, acuminated, glabrous, flat. *h.* 20ft. Naturalised in India, &c., 1790. (B. M. 3952; B. R. 114.) SYN. *P. acuminata.*

P. bicolor (two-coloured). *fl.* white, with a yellow throat, a very long, thick, incurved tube, and obovate-oblong, oblique segments; peduncles thickened at top, corymbose. July. *l.* lanceolate-oblong, with revolute edges, acuminated, 1ft. long. *h.* 15ft. West Indies, 1733. (B. R. 480.)

P. Jamesoni (Jameson's). *fl.*, corolla large, hypocrateriform: tube long, yellow, deeply tinged with red; limb of five rich yellow segments; peduncles terminal, 9in. to 12in. long; pedicels red. July. *l.* mostly confined to the tips of the branches, large, broadly-oblong, on rather long, nearly terete petioles (furrowed on the upper side), attenuated at base, acuminated at the extremity. *h.* 4ft. Guayaquil. (B. M. 4751.)

Plumeria—*continued.*

P. Kerii (Ker's). A synonym of *P. tricolor.*

P. Lambertiana (Lambert's). *fl.* white, with a yellow throat, and broad-rhomboid, obtuse segments. May to August. *l.* oblong, acuminated, flat. *h.* 10ft. Mexico, 1824. This differs from *P. tricolor* in having larger, inodorous flowers, and in the segments being broader and rounder. (B. R. 1378.)

P. lutea (yellow-flowered).* *fl.* very sweet-scented; corolla 4in. in diameter; lobes very pale pink, with a broad, pale golden-yellow base; tube hairy within; cymes terminal, sub-umbellate, about as long as the leaves. June. *l.* crowded at the ends of the branches, spreading, 8in. to 18in. long, narrowly oblong-obovate, tapering into the stout petiole, sub-acute. Branches and branchlets stout, scarred. *h.* 10ft. to 20ft. Peru, 1869. (B. M. 5779.)

P. rubra (red).* Frangipani-plant. *fl.* red, crowded in fascicles, with a pilose throat, and obliquely obovate-oblong segments, which are rounded at the apex; peduncles elongated. July. *l.* obovate-oblong, acute, with flat edges. *h.* 12ft. to 20ft. Jamaica, 1690. (B. M. 279; B. R. 780.)

P. tricolor (three-coloured). *fl.*, corolla with a yellow throat, white above the yellow part, and red round the margins of the segments; peduncles terminal, cymose. July to October. *l.* obovate-oblong, tapering at both ends, entire. *h.* 15ft. 1815. See Fig. 207. (B. R. 510.) SYN. *P. Kerii.*

P. tuberculata (warty-stemmed). *fl.* white, scentless; peduncles axillary, much shorter than the leaves, many-flowered. August. *l.* coriaceous, narrow-oblong, obtuse, tapering a little way into the petioles, downy beneath. Branches tuberculate. *h.* 6ft. St. Domingo, 1812. (L. B. C. 681.)

PLUM, GINGERBREAD. *See* **Parinarium macrophyllum.**

PLUM, MAIDEN. *See* **Comocladia.**

PLUMOSE. Feathery, as the pappus of Thistles.

PLUM SLUG. *See* **Slugworms.**

PLUM TORTRIX. *See* **Plum** (INSECTS).

PLUM WEEVILS. *See* **Plum** (INSECTS).

PLURI. Used in composition, this term signifies many or several, *e.g.*, Plurilocular, many-celled.

PLURIDENS. A synonym of *Bidens.*

PLUSIA. A genus of *Noctuidæ*, the larvæ of some of which do considerable injury to cultivated plants. The British species vary between 1¼in. and 1¾in. in spread of wings, and they almost all possess shining metallic, silvery, or golden spots and markings on the rather pointed front wings. The thorax and abdomen bear crests of hair-like scales. The moths generally fly during the day; when at rest, the wings are held like a roof over the hinder part of the body. The larvæ are rather slender, tapering markedly towards the head, which is small; they have six true legs in front, but only six prolegs, being the last three pairs of the five usually present in larvæ of *Noctuæ.* Owing to the absence of the front prolegs, they "loop" in walking, like Geometer larvæ. When full-fed, they spin loose cocoons among dead leaves, or on the food-plants, and in these become black pupæ. Two, or even more, broods may be hatched in a year.

The larvæ of several species feed on Groundsel, Nettles, and other low weeds, and may at times devour cultivated plants along with these; but the only species that is really dangerous to garden and field produce is *P. Gamma*, the too well-known Silver Y, or Gamma Moth. The larva of the moth is, indeed, one of the worst pests at times, alike in the garden and in the field. The moths may be seen, from June to the end of October in some years, flying in the bright sunshine, and not less in the twilight; nor do they cease to fly even at night. Frequently, they swarm in myriads in hay-fields, among Turnips, in gardens, and, in fact, everywhere. Some idea of the form, size, and markings, may be obtained from Fig. 208, in which, however, the characteristic silvery mark on the front wings, like the Greek letter *gamma* (γ), or the letter *y*, is not well shown. It is plainest in the left wing near the middle. The front wings are grey or violet-grey, marbled with warm brown, which is darkest in a lozenge-shaped patch on the inner margin; in this patch lies

Plusia—*continued.*

the silvery *y*. The hind wings have a broad, dark band along the margin, and the basal space is pale grey. The eggs are laid on the lower surface of the leaves. The larvæ are thickest at the twelfth segment, tapering forwards. They are bright green, with bluish-green dorsal line, bordered along each side with a white line; and there are four more narrow white lines and a yellow line on each side, near the spiracles or breathing pores. There are a good many scattered, fine bristles on the body. The larvæ rest with the back arched, and move by looping. They feed upon all kinds of herbs, including

FIG. 208. PLUSIA GAMMA.

Nettles and other weeds, as well as upon many low cultivated plants, such as Cabbages, Beets, Peas, Beans, &c. The best methods of effectively lessening their numbers are to destroy the larvæ, either by hand-picking, or by sweeping them, or beating them, off their food, and destroying them at once; or ducks and hens may be turned in to feed on them. Dusting the plants with soot or caustic lime is also recommended, though not very safe for delicate plants. Among the points to be specially attended to is the removal of weeds from gardens and field crops alike, as they afford shelter for the insects.

PLUTELLA CRUCIFERARUM. A small moth, known also as the Diamond-back or Turnip-moth, belonging to the group of *Tineina*. It is excessively common throughout Great Britain; and, despite its small size, the ravages committed by the larvæ in some years are sufficient to force it on the notice of every observant farmer and gardener. The wings are about ⅝in. across. They are narrow, with long fringes, and are of a greyish-brown colour, with darker spots, the inner margin bearing a long, pale ochreous streak, with three prolongations into the dark part. While at rest, the moths sit in a very characteristic attitude, with the antennæ held straight forward, and nearly touching their support, and the wings folded over the body, like the sloping sides of a roof. The pale edges are thus in contact, and resemble a row of three diamond-shaped spots. The legs are nearly hidden by the wings in the sitting insect. The larvæ are pale green in colour, with a darker head, several black dots on the next segment, and two yellowish spots on each of the next two segments. They have a few bristly hairs on the body, which tapers a little towards each end. They feed on the lower surface of the leaves of Turnip, Cabbage, and other *Cruciferæ*, eating away the substance of the leaf between the veins. Frequently, a dozen or more may be found on a leaf, and, when very numerous, or while the plants are small, the crop is apt to suffer severely. When full-fed, the larvæ spin slight cocoons in the hollows between the leaf-veins on the lower surface, or on the soil, among rubbish, and change into pale brown pupæ, marked with black lines on the back and wing-cases. The moths emerge in from two to three weeks. There are two chief broods in the year, the moths appearing in May and August, and the larvæ about a month or six weeks later.

Remedies. These are very difficult of application, since the larvæ live protected by the leaves from the direct application of insecticides, while their numbers and small

Plutella Cruciferarum—*continued.*

size render hand-picking slow, and unlikely to be successful, except on a small scale. The removal and destruction of leaves, with numerous larvæ and pupæ on them, and also of surface rubbish in autumn, lessens the risk to future crops. Brushing below the plants with branches of Firs, or of other twiggy shrubs or trees, has been recommended as likely to remove a number of the larvæ. Whatever favours rapid growth in the plants, *e.g.*, manures and watering the plants in dry weather, will be of service; and gas lime and soot, thrown below the plants, might assist in keeping away the moths during the time of egg-laying, and in reducing the injury to the leaves.

PNEUMONANTHE. Included under *Gentiana*.

POA (from *poa*, an ancient Greek name for grass or fodder). Meadow Grass. ORD. *Gramineæ*. A large genus (about eighty species) of hardy, sometimes dwarf annual, sometimes taller and perennial, grasses, broadly dispersed, but mostly found in North temperate regions. Inflorescence either in spreading or close panicles, the spikelets, for the most part, several-flowered and awnless; outer glumes unequal, and generally keeled; upper pales shorter and narrower, with inflexed, membranous margins. Few of the species are grown in gardens, being mostly of agricultural value. Eight are British plants. The following are probably as much worth growing as any. They are of very easy culture in ordinary garden soil. Propagated by seeds, or by divisions.

P. fertilis (fertile). A synonym of *P. palustris*.

P. palustris (marsh-loving). *fl.*, inflorescence in airy, diffuse, purplish or violet-tinged panicles, rising to a height of from 2½ft. to 3ft. *l.* long, soft, smooth, slender, arching, and forming dense tufts. Southern Europe, &c. A very desirable species, and one of the best for forming dense, isolated tufts, near the banks of streams. SYN. *P. fertilis*.

P. trivialis albo-vittata (common white-striped).* A very elegant, dwarf, perennial grass, forming dense tufts of erect leaves, which are flat, and broadly margined with pure white. Though a variety of a hardy species, it is most effective, and proves, in respect to its foliage, to be a very useful decorative plant, when grown in pots, under glass. *h.* 6in. 1868. (F. d. S. 1695.)

POARCHON. A synonym of **Trimezia** (which *see*).

POCOCKIA. Included under **Trigonella** (which *see*).

POCULIFORM. Resembling a drinking-cup or goblet in shape.

POD. A several-seeded, dehiscent, dry fruit. The

FIG. 209. THREE-VALVED POD OF YUCCA.

term is more usually applied to a Legume or Siliqua. A three-valved Pod of Yucca is shown at Fig. 209.

PODALYRIA (Podalyrius, in heathen mythology, was the son of Æsculapius). ORD. *Leguminosæ*. A genus comprising seventeen species of greenhouse, evergreen shrubs, more or less silky or silvery-pubescent, natives of South Africa. Flowers one or two, rarely three or four, on axillary peduncles; calyx widely campanulate, remarkably indented at its insertion on the stalk; vexillum suborbiculate, emarginate. Pods ovoid or oblong, turgid. Leaves simple, alternate, continuous with the petioles; stipules subulate, often deciduous. The species, which are rarely seen in cultivation, require a well-drained compost of sandy loam and fibry peat. Propagated, in spring, by cuttings of stubby side-shoots, inserted in sand, under a bell glass.

P. argentea (silvery). *fl.* white; calyx three-toothed, subbilabiate, rusty-tomentose; standard large, obcordate, longer than the clawed, axe-shaped wings; keel shorter than the wings. June. *l.* oval, sharp at both ends, with rust-coloured margins. *h.* 6ft. 1789. SYN. *P. biflora* (B. M. 753).

P. biflora (two-flowered). A synonym of *P. argentea*.

P. buxifolia (Box-leaved). *fl.* purple, with paler wings; pedicels one-flowered, about the length of the leaves. May to July. *l.* oval or oblong, bluntish, glabrous above, silky beneath. *h.* 2ft. to 4ft. 1790. (B. R. 869.)

P. calyptrata (covered).* *fl.* pale purple; pedicels one-flowered, about equal in length to the leaves. May to July. *l.* oval or obovate, mucronate, pubescent, reticulated beneath. *h.* 6ft. 1792. (B. M. 1580.) SYN. *P. styracifolia*.

P. sericea (silky). African Satin-bush. *fl.* pale purple; pedicels one-flowered, much shorter than the leaves, and, as well as the calyces, clothed with appressed, silky pubescence. January to October. *l.* oblong-ovate, mucronate, silky on both surfaces. *h.* 4ft. to 6ft. 1778. (B. M. 1923.)

P. styracifolia (Styrax-leaved). A synonym of *P. calyptrata*.

PODANTHES (from *pous, podos*, a foot, and *anthos*, a flower; alluding to the flowers being borne on long pedicels). SYN. *Obesia*. ORD. *Asclepiadeæ*. A genus comprising about eight species of stove shrubs, allied to *Stapelia*, confined to South Africa. Flowers rather large, solitary, twin or rarely sub-fasciculate; calyx with five acute segments; corolla pale or spotted above, broadly campanulate or at length rotate, the lobes valvate. Stems low, leafless, thick-fleshy, deeply sub-quadrangular; angles decussate and deeply few-toothed. The best-known species are those described below. For culture, *see* **Stapelia.**

P. geminata (twin).* *fl.* usually twin; corolla orange-yellow, dotted with blood-colour; segments lanceolate, acuminate, hairy inside, the margins revolute; outer corona five-lobed. May to November. Joints of branches proliferous, creeping, sub-oval, obscurely tetragonal, floriferous at the tops. 1795. Plant creeping. (B. M. 1326 and L. B. C. 300, under name of *Stapelia geminata*.) The correct name of this plant is *Piaranthus geminatus*.

P. irrorata (bedewed). *fl.*, corolla sulphur-coloured and spotted with blood-colour, more semi-quinquefid than in *P. pulchra*, the bottom blood-coloured; segments tipped with purple, lanceolate, acuminated; pedicels usually solitary. July to September. Branches numerous, erectish, decumbent. 1795. (L. B. C. 127, under name of *Stapelia irrorata*.)

P. pulchra (fair). *fl.* on long, bent pedicels, twin, semi-quinquefid, corrugated; segments of corolla green outside and sulphur-coloured inside, deltoid, acuminated, with numerous dark brown warts; bottom of corolla dark brown, girded by a few glandular hairs. 1800. Plant weak and much branched, creeping.

P. p. verrucosa (warted). *fl.*, corolla pale yellow, with dark purple marks; segments of the outer corona emarginate; the inner one of ovate, yellow corpuscles. Branches longer and thicker than in the type. (B. M. 786, under name of *Stapelia verrucosa*.)

PODANTHUS (from *pous, podos*, a foot, and *anthos*, a flower; in allusion to the stalked flowers). SYN. *Eucænia*. ORD. *Compositæ*. A genus consisting of only two species (closely related) of greenhouse or hardy, much-branched, scabrous-puberulous, resinous shrubs, natives of Chili. Flower-heads yellow, small, diœcious, at length globose, at the tips of the branches or in the upper axils, shortly pedunculate; achenes slightly scabrous-pilose or papillose; involucre small, with few,

Podanthus—*continued.*

narrow bracts; receptacle convex. Leaves opposite, entire or toothed. The species thrive in a compost of peat and loam. Propagation may be effected by cuttings, inserted in sand, under a glass.

P. Mitiqui (Mitiqui). *l.* oval-lanceolate, long-cuneate at base, acuminate at apex, deeply serrate. *h.* 3ft. 1824. Greenhouse.

P. ovatifolius (ovate-leaved). *l.* broadly ovate, not decurrent into the petiole. *h.* 2ft. 1825. Greenhouse. SYN. *Euxenia grata*.

PODIUM, PODUS. Used in Greek compounds, these signify a stalk, stipe, &c.; *e.g.*, Podocephalus, stalked-headed; Leptopodus, slender-stalked.

PODOCALLIS. A synonym of **Massonia** (which *see*).

PODOCARPUS (from *pous, podos*, a foot, and *karpos*, a fruit; the fruits are footstalked). Including *Nageia*. ORD. *Coniferæ*. Of this genus, upwards of sixty species have been enumerated; but, according to the authors of the "Genera Plantarum," less than forty are entitled to specific rank. They are stove, greenhouse, or half-hardy, evergreen trees, rarely shrubs, frequently found in Southern extra-tropical regions, and in tropical mountainous and Eastern Asia; a few inhabiting the mountainous parts of tropical America. The species are absent in Europe, Western Asia, North Africa, and North America. Flowers monœcious or diœcious, axillary or sub-terminal; males solitary, or two to five in a whorl, or many at the sides of a loose, elongated, spicate rachis; females solitary or rarely twin. Fruit drupaceous or nut-like, rarely exceeding ½in. in diameter, often shortly stipitate above the receptacle. Leaves variable. The species thrive in any well-drained, friable loam, and are readily propagated by means of cuttings of the nearly ripened young shoots, inserted in sandy soil, under a bell glass, in a close house or frame, and shaded, during bright sunshine, until rooted. The under-mentioned are the species best known to cultivation. Except where otherwise stated, they are trees, and require greenhouse treatment.

P. andina (Andes).* Plum Fir. *fr.* resembling in form and size the berry of an ordinary White Grape, but in structure that of a Cherry, the kernel being contained in a hard stone, or nut, surrounded by a soft, fleshy pulp, inclosed in a tough rind; when ripe, the fruit has an agreeable flavour. *l.* linear, flattened, ½in. to ¾in. long, sub-distichous, deep green above, and slightly glaucous beneath. *h.* 40ft. to 50ft. Valdivia, Chili, 1860. Hardy. The trunk is well furnished with branches, the lower ones drooping, often sweeping the ground. SYN. *Prumnopitys elegans*.

P. Bidwilli (Bidwill's). A synonym of *P. Totara*.

P. chinensis (Chinese). Chinese Yew-tree. *fl.*, males numerous, axillary; females on lateral footstalks. *fr.* cylindrical-oblong, globular when old. *l.* linear-lanceolate, reflexed on the margins, closely placed, alternate, somewhat two-rowed, 1¾in. to 3in. long, two to three lines wide, the elongated rib terminating in an obtuse point. Branches erect, spreading, alternate or opposite, sometimes somewhat vertical. *h.* 20ft. China and Japan, 1838. A large bush or small tree. SYNS. *P. Maki, Taxus Makoya*.

P. coriacea (leathery). *fr.* globose, solitary, axillary, very small. *l.* elliptic-lanceolate, rather thick, leathery, shining, sessile or tapering at the base into a very long footstalk, almost obtusely pointed at apex, 2in. to 3in. long, nearly ½in. broad, with an elevated midrib. Branches spreading, horizontal, alternate or opposite, naked on the greater part of the larger ones. *h.* 40ft. to 50ft. Jamaica, &c.

P. coriacea (leathery), of gardens. A synonym of *Cephalotaxus drupacea*.

P. dacrydioides (Dacrydium-like). *l.* of two forms—of young trees, and on twigs of old, distichous, ⅛in. long; those on old branches imbricated. Diameter of trunk 4ft. *h.* 150ft. New Zealand.

P. elongata (elongated). South African Yellow-wood. *fr.*, seeds about the size of a gooseberry, marbled on the outside. *l.* linear or oblong-lanceolate, straight, rarely falcate, attenuated, stiff, rather thick, 1¼in. to 1¾in. long, two lines broad, dark green or glaucous-blue, sessile or regularly tapering to a short footstalk. Branches opposite or in whorls; upper ones ascending, lower ones sometimes deflected. *h.* 30ft. to 70ft. Cape of Good Hope.

P. Endlicheriana (Endlicher's). *l.* alternate, closely arranged on the branches, somewhat two-rowed, straight or slightly falcate, undulated; those on the branchlets almost oval or

Podocarpus—*continued.*

elliptic, with several leaves in a whorl, 4in. to 7in. long, six to eight lines broad. Branches mostly in whorls of three, rarely scattered, ascending, and little divided. India (?). A tall tree.

P. ensifolia (sword-leaved). *l.* thinly scattered along the branchlets, spreading, leathery, straight or somewhat falcate, elongate-lanceolate, blunt at the point, tapering and somewhat twisted at the base, ⅜in. to 1in. long, ⅛in. broad. Tasmania, &c. A small tree.

P. ferruginea (rust-coloured). *fr.* red-purple, ⅜in. long, glaucous. *l.* distichous, linear-acute, falcate, one-nerved, ⅛in. to ⅜in. long, red-brown when dry. Trunk 3ft. in diameter. *h.* 50ft. to 80ft. New Zealand. The wood of this species is brittle and durable, close-grained and reddish.

P. japonica (Japanese). *l.* alternate, flat, linear-lanceolate, elongated, obtuse-pointed, thick, leathery, 4in. to 8in. long, about ½in. wide, with an elevated rib, almost acute on the upper surface, tapering into a long, slender point at the apex, and into a short, stout footstalk at the base. Japan. A small, hardy tree.

P. koraiana (Corean). A synonym of *Cephalotaxus pedunculata fastigiata.*

P. macrophylla (large-leaved). A synonym of *P. neriifolia.*

P. Maki (Maki, native name). A synonym of *P. chinensis.*

P. Nageia (Nageia). *fr.* blackish-purple, solitary, rarely twin, orbicular, about the size of a cherry. *l.* in opposite pairs, but frequently alternate, elliptic or oblong-lanceolate, attenuated at base, and acuminated at the point, 3in. long, rather above 1in. broad. Branches spreading, alternate or opposite, slender, frequently pendent, with leaves in double pairs or threes. *h.* 30ft. to 60ft. China and Japan. A handsome, hardy species, of which there is a variegated form in cultivation. (S. Z. F. J. 135.) SYN. *Nageia japonica.*

P. neriifolia (Oleander-leaved).* *fl.*, male catkins long, axillary and solitary; females on one-flowered peduncles. *l.* alternate, but mostly closely placed, erect or spreading, lanceolate, acute-pointed, often reflected below, 3in. to 6in. long, ¼in. to ⅜in. broad. Branches slender, verticillate. Nepaul, &c. A large tree. In Nepaul, the peduncles of the fruit (not the fruit itself) are eaten. (B. M. 4655; F. d. S. 768.) SYN. *P. macrophylla.*

P. nubigena (cloud-born). *fr.* oblong, axillary, short-stalked, edible. *l.* linear-lanceolate, straight or somewhat falcate, rigid, attenuated at base, with a short, stout footstalk, ⅜in. to 1¾in. long, ⅛in. broad. Chili, &c. A large tree.

P. Purdieana (Purdie's). Yacca-wood-tree. *l.* elliptic or oblong-lanceolate, thick, leathery, very smooth, shining above, flat, straight, rarely falcate, slightly recurved at the margins, 3in. to 5in. long, ⅜in. to 1in. broad, regularly tapering into a short, stout footstalk. Branches spreading, horizontal, marked by the scars of fallen leaves. *h.* 100ft. or more. Jamaica.

P. spinulosa (slightly spiny). Illawarra Pine. *l.* alternate or opposite, or in whorls, linear-falcate, spreading in all directions, pungent, smooth, and thick, 1in. to 1¾in. long, one line broad. Branches slender, spreading. Australia. A much-branched, erect shrub.

P. Totara (Totara). Mahogany or Totara Pine. *fr.* solitary or twin, on a swollen peduncle, as large as a cherry. *l.* distichous or not so, very coriaceous, erect, spreading or recurved, straight or falcate, ½in. to 1½in. long, linear, acuminate, pungent. *h.* 60ft. A spreading tree; the wood is red, close-grained, and very durable. SYN. *P. Bidwilli.*

P. vitiensis (Vitian).* *fl.*, male catkins terminal, cylindrical, 1in. to 1½in. long. *fr.* obovate, obtuse, scarcely 1in. long. *l.* 1in. long, ¼in. broad, ovate-lanceolate, acute. *h.* 60ft. Viti Levu. A handsome tree, with light, glossy green foliage, thickly set in a distichous manner on the symmetrically-arranged branches. (G. C. n. s., xxv. 465.)

PODOLASIA (from *pous, podos*, a foot, and *Lasia*, from which genus it differs in having a long stipe to the spadix). ORD. *Aroideæ* (*Araceæ*). A monotypic genus. The species is a slender, stove perennial, of striking habit, with a short, erect caudex. It requires culture similar to **Arum** (which *see*).

P. stipitata (stipitate). *fl.*, spathe brownish-red, 3½in. to 4in. long, boat-shaped, open at the base; spadix cream-coloured, changing to brownish, shorter than the spathes, rather long-stipitate; peduncle about 1ft. long, incurved or having a few prickles. *l.* sagittate or hastate, with elongated, narrow, acuminate lobes; petioles long and prickly. *h.* 1ft. Borneo, 1882.

PODOLEPIS (from *pous, podos*, a foot, and *lepis*, a scale; referring to the scaly flower-head stalks). SYN. *Scalia.* Including *Panætia* and *Stylolepis.* ORD. *Compositæ.* A genus comprising twelve species of greenhouse or hardy, annual or perennial, Australian herbs. Flower-heads yellow, pink, or purple, heterogamous, terminal, pedunculate or rarely sessile; involucre hemispherical or rarely ovoid; receptacle flat, without scales; ray florets few or numerous, in a single row. Leaves alternate, lanceolate or linear, entire, often stem-clasping. The under-mentioned species are those best known to cultivation. They are generally treated as annuals, and are well adapted for beds in a position fully exposed to the sun. A light and well-drained soil is most suitable. Seeds should be sown in April, in a gentle heat, and the seedlings transferred to the open air in June, about 1ft. apart. A sowing can also be made in the open during May or June, thinning out to 1ft. apart. *P. aristata* makes a very pretty subject for pot culture.

FIG. 210. FLOWERING BRANCHES OF PODOLEPIS ARISTATA.

P. acuminata (taper-pointed). *fl.-heads* yellow, the florets exceeding the involucre; involucral bracts scarious. Summer. *l.* petiolate, oblong or lanceolate, smaller upwards and clasping the stem. *h.* 1½ft. Hardy annual. SYNS. *P. rugata* (R. G. 320), *Scalia jaceoides* (B. M. 956).

P. aristata (awned).* *fl.-heads* golden-yellow, with small, pink

Podolepis—*continued.*

ray florets. Summer. *l.* linear or lanceolate, stem-clasping, and often decurrent. *h.* 1ft. This hardy annual species closely resembles *P. acuminata*, but has its involucral bracts usually terminated by a fine bristle. See Fig. 210. SYN. *P. chrysantha.*

P. chrysantha (golden-flowered). A synonym of *P. aristata.*

FIG. 211. PODOLEPIS GRACILIS, showing Habit, detached Flower-head, and Portion of Stem with shortly decurrent Leaf.

P. gracilis (slender).* *fl.-heads* purple, lilac, or white; peduncles usually rather long. August. *l.* linear or lanceolate, stem-clasping, and often decurrent. *h.* 3ft. 1826. This pretty perennial species is a much more delicate plant than either of the preceding. See Fig. 211. (B. M. 2904; S. B. F. G. 285.)

P. rugata (wrinkled). A synonym of *P. acuminata.*

PODOLOBIUM. Included under **Oxylobium** (which *see*).

PODOPELTIS. Included under *Nephrodium.*

FIG. 212. PODOPHYLLUM PELTATUM.

PODOPHYLLUM (from *pous, podos,* a foot, and *phyllon,* a leaf; alluding to a fancied resemblance, in the five to seven-parted leaf, to the foot of some web-footed animal). Duck's-foot. ORD. *Berberideæ.* A small genus (three species) of hardy perennial herbs, with creeping rootstocks and thick, fibrous roots; one is a native of North America, the second of the Himalayas, and the third (not yet introduced) of Formosa, &c. Flowers white, solitary, terminal, shortly pedunculate, nodding; sepals six; petals six or nine. Berry indehiscent. Leaves peltate, palmately nerved and lobed; cauline ones one or two. The species thrive in moist, marshy, peat borders, in a shady situation. Propagated by division, and by seed.

P. Emodi (Emodi).* *fl.* 1in. to 1½in. across; sepals very deciduous; petals six, sometimes four, obovate-oblong; peduncle terminal in bud, then apparently supra-axillary. *fr.* red, 1in. to 2in. long, ellipsoid, edible. *l.* two, vernal, alternate, long-petiolate, plaited and deflexed in venation, orbicular, 6in. to 10in. across, three to five-lobed to the middle or base; lobes cuneate, acutely serrated. Stem or scape, 6in. to 12in. high, erect. India. (G. C. n. s., xviii. 241.)

P. peltatum (peltate). American Mandrake; May Apple. *fl.* nearly 2in. broad; bud with three green bractlets, which early fall away; stamens twelve to eighteen. *fr.* ovoid, 1in. to 2in. long, sweet, and slightly acid, edible, ripe in July. *l.* five to nine-parted; lobes oblong, rather wedge-shaped, somewhat lobed and toothed at the apex. Flowerless stems terminated by a large, round, seven to nine-lobed leaf, peltate in the middle, like an umbrella. Flowering stems bearing two one-sided leaves, with the stalk fixed near the inner edge. *h.* 6in. to 12in. North America, 1664. The leaves and roots of this plant are poisonous. See Fig. 212. (B. M. 1819; B. M. Pl. 17.)

PODOPTERUS (from *pous, podos,* a foot, and *pteris,* a wing; in allusion to the outer perianth segments being winged). ORD. *Polygoneæ.* A monotypic genus. The species is a handsome, greenhouse shrub, with rigid, flexuous branches and branchlets, usually spinescent at the tips. It requires a compost of equal parts loam and peat. Increased by young cuttings, which root readily, if inserted in any light soil, under a glass.

P. mexicanus (Mexican). *fl.* pink, small, twin or few in the axils of the bracts; perianth of six segments; fascicles racemose; racemes wavy at the tips of the branches, loosely sub-paniculate. July. *l.* obovate-oblong, membranous, slightly acute, attenuated at base, sub-sessile, 1in. long, ½in. or more broad, minutely puberulous, fasciculate in the nodes. *h.* 2ft. Mexico, 1825.

PODORIA. A synonym of **Boscia** (which *see*).

PODOSPERMA. A synonym of **Podotheca** (which *see*).

PODOSPERMUM. Included under **Scorzonera** (which *see*).

PODOSTEMACEÆ. A small natural order of aquatic, annual or perennial herbs, mostly very small, natives of rocky river-beds in the tropics. Flowers hermaphrodite, or, in one genus, dicœcious, variously disposed, but usually inclosed in a spathaceous, marcescent involucre, which is at first closed, then bursts; perianth membranous, trifid or five-parted, or wanting; stamens definite or indefinite, free or monadelphous, erect. The plants have a distinct or branched stem and leaves, or these are confluent into broad or narrow Alga-like fronds. The 120 species comprised in the order have little or no economic or garden value; they are classified in twenty-one genera. Examples are: *Apinagea, Hydrostachys,* and *Podostemon.*

PODOSTIGMA (from *pous, podos,* a foot, and *stigma*; alluding to the stalked stigma). ORD. *Asclepiadeæ.* A monotypic genus, the species being a half-hardy, glabrous or scarcely pubescent, erect herb. For culture, *see* **Asclepias.**

P. pubescens (pubescent). *fl.* orange-coloured, in four to six-flowered umbels, on lateral peduncles; corolla as long as the pedicel, longer than the peduncle, the oblong lobes wavy on the margins. July. *l.* erect, 1in. to 2in. long. Stem 6in. to 12in. high. Root tuberous. Southern United States, 1824. SYN. *Stylandra pumila.*

PODOTHECA (from *pous, podos*, a foot, and *theke*, a cell or capsule; alluding to the stalk of the fruit). SYNS. *Lophoclinium, Phœnopoda, Podosperma.* ORD. *Compositæ.* A genus comprising five species of glabrous or scabrous-pubescent, erect, hardy, Australian annuals, not woolly, or rarely the involucre very slightly so. Flower-heads yellow, homogamous, rather large, sometimes very long, on terminal peduncles, usually dilated under the involucre; involucre cylindrical, conical, or campanulate, with imbricated, herbaceous bracts; receptacle without scales; florets tubular, five-toothed. *P. gnaphalioides* is a plant of little beauty; it thrives in any ordinary garden soil, and may be readily increased by seeds.

P. gnaphalioides (Gnaphalium-like). *fl.-heads* on long peduncles; florets very slender, considerably longer than the involucre and pappus. June. *l.* linear or lanceolate, the lower ones narrowed below the middle, all stem-clasping, and sometimes shortly decurrent. *h.* 1ft. to 1½ft. 1841. (B. M. 3920.)

PŒCILIPTERIS. Included under *Acrostichum.*

PŒPPIGIA. A synonym of **Tecophilæa** (which *see*).

PŒSIA. Included under **Pteris** (which *see*).

POET'S CASSIA. *See* **Osyris.**

POET'S NARCISSUS. *See* **Narcissus poeticus.**

POGGENDORFFIA. Included under **Tacsonia** (which *see*).

POGOGYNE (from *pogon*, a beard, and *gyne*, a female; referring to the villous style). ORD. *Labiatæ.* A small genus (six species) of dwarf or erect, hardy annuals, natives of California. Flowers whorled, collected into dense, leafy spikes; calyx campanulate, five-toothed; corolla with a straight, exserted tube, and a bilabiate limb. Nutlets ovoid, smooth. Leaves linear, entire, or the upper or floral ones slightly conformed, long-ciliated, somewhat toothed. *P. Douglasii* is the only species introduced. Seed should be sown in pots, and the seedlings turned out into the open border.

P. Douglasii (Douglas'). *fl.*, corolla purple or dark violet; lower calyx teeth thrice as long as the tube; bracts linear, acute, almost leaf-like; spikes oblong, 2in. to 3in. long. August. *l.* petiolate, 1in. to 1½in. long, oblong, obtuse, entire, gradually narrowed to the base, glabrous. Stem slightly branched. *h.* 1ft. 1871. (B. M. 5886.)

P. D. multiflora (many-flowered). A smaller form, with lilac corolla, and rather shorter bracts than the type.

POGON. A beard. The word is largely used in Greek compounds, and denotes any collection of long hairs.

POGONELLA. A synonym of **Simethis** (which *see*).

POGONIA (from *pogonias*, bearded; referring to the fringed lip of some of the original species). Including *Cleistes* and *Triphora.* ORD. *Orchideæ.* A genus comprising upwards of thirty species of stove, terrestrial orchids, with spherical tubers, broadly dispersed over the globe. Flowers solitary or loosely racemose, having free, conniving, or somewhat ringent sepals and petals, either all equal or the petals smaller; a free, erect, undivided or lobed lip, with its disk crested or papillose; a long, semi-terete, clavate column, eared or winged at the top; and a sessile or very shortly stalked two-celled anther, containing two furrowed pollen masses. Plants either having one or a few sessile leaves upon an erect stem at the period of flowering, or leafless till after flowering, and then producing a solitary, stalked leaf from an underground stem. The under-mentioned species thrive in well-drained pots or pans of open, loamy soil, amongst which is intermixed living sphagnum. An abundance of water is required during the season of growth, but after the leaves die off none must be administered until growth recommences the following season. All do well

Pogonia—*continued.*

in a warm, shaded greenhouse, in an airy position near the glass.

P. discolor (different-coloured). *fl.* in pairs, 1½in. in diameter; sepals and petals dirty grey-green, ¾in. long, spreading; lip white, with a green disk, convolute; scape solitary, 2in. to 3in. long. *l.* solitary, 3in. to 5in. in diameter, nearly horizontal, orbicular-cordate; upper surface dark rufous-green, often with paler blue-green blotches, bristly; under surface dull purple, less bristly. Java. (B. M. 6125.)

P. Fordii (Ford's).* *fl.* drooping, 1½in. from tip of dorsal sepal to that of the lip; sepals and petals similar, linear-oblanceolate, acuminate, dirty-yellowish, with three brown nerves; lip as long as the sepals, glabrous, convolute portion white; lobes rose-coloured. *l.* shortly stalked, orbicular, acute, plaited by about twelve strong nerves; upper surface dull brownish-green and purple, sparsely clothed with crystalline, cellular hairs; under surface rose-coloured. Hong Kong, 1883. SYN. *P. pulchella* (B. M. 6851).

P. Gammieana (Gammie's).* *fl.* six to eight in a raceme; sepals and petals pale lilac, streaked with pale pink, ¾in. to 1in. long; lip pale green, as long as, or rather longer than, the sepals; scape 6in. to 8in. high. May. *l.* solitary, quite glabrous, 4in. to 6in. long and broad, with a very deep sinus; young ones plaited between the nerves, with a row of very shallow, broad pits on each fold; petiole streaked with red-brown. Sikkim, 1847. (B. M. 6671.)

P. ophioglossoides (Ophioglossum-like). Snake's-mouth Orchis. *fl.* rose-pink, 1in. long, sweet-scented; lip spathulate below, appressed to the column, beard-crested and fringed. June and July. Stem 6in. to 9in. high, bearing a single oval or oblong-lanceolate leaf near the middle, and a smaller one or bract near the terminal flower, rarely one or two others with a flower in their axil. North America, 1816. (B. R. 148; H. E. F. 70.)

P. pendula (pendulous). Three Birds Orchis. *fl.* pink, drooping, on slender pedicels; lip spathulate, somewhat three-lobed, roughish or crisped above, crestless. August. *l.* three to seven to a stem, alternate, ovate-amplexicaul, 3in. to 6in. long, the upper one to four bearing flowers in their axils. Stem 3in. to 8in. high, from oblong tubers. North America, 1824. (B. R. 908.) SYN. *Triphora pendula.*

P. pulchella (pretty). A synonym of *P. Fordii.*

P. rosea (rosy). *fl.*, sepals greenish outside, lake-coloured inside; floral envelopes lilac, approaching pink; lip with two whitish, ovate glands at the base; scape terete and smooth. August *l.* lanceolate, acute, stem-clasping, marginate, smooth, entire. *h.* 3ft. to 5ft. Guayana, 1844. A beautiful plant.

POGONIA (of Andrews). A synonym of **Myoporum** (which *see*).

POGONOPUS (from *pogon*, a beard, and *pous*, a foot; in allusion to the shape of the flower). SYNS. *Chrysoxylon, Howardia.* ORD. *Rubiaceæ.* A genus comprising about five species of stove trees and shrubs, with terete branchlets, natives of tropical America. Flowers pink, showy, pedicellate, disposed in terminal, branched panicles; calyx five-toothed, deciduous; corolla with an elongated tube and a limb of five short, valvate lobes. Leaves opposite, petiolate, ample, membranous; stipules intrapetiolar, small, deciduous. *P. caracasensis* (the only species in cultivation) requires culture similar to **Mussænda** (which *see*).

P. caracasensis (Caraccas). *fl.* pink; calyx teeth triangular, acuminate, the lobes foliaceous, ovate; corolla tubular, hairy. Summer. *l.* ovate or obovate-elliptic, rather long-acuminate, the point very acute, base cuneate, pubescent beneath. Shrub. 1855. (B. M. 5110.) SYN. *Howardia caracasensis.*

POGOSTEMON (from *pogon*, a beard, and *stemon*, a stamen; alluding to the filaments being generally bearded in the middle). SYN. *Wensea.* ORD. *Labiatæ.* A genus comprising about thirty species of stove or greenhouse herbs (or shrubs?), natives of the East Indies, the Malayan Archipelago, and Japan. Flowers disposed in many- or rarely few-flowered whorls; calyx ovoid-tubular, equal, five-toothed, often elongated during fructescence; corolla tube included or rarely shortly exserted; limb spreading, cut into four sub-equal lobes; bracts usually small. Nutlets ovoid or oblong, smooth. Leaves opposite. The only species now in cultivation are those described below. For culture, *see* **Colebrookia.**

P. Patchouli (Patchouly). *fl.* whitish, tinged with purple, small, in dense spikes, which are both terminal and axillary

Pogostemon—*continued.*

June. *l.* broadly ovate, stalked, 3in. to 4in. long. *h.* 3ft. East Indies, 1848. Greenhouse soft-wooded shrub. This species affords the celebrated Patchouli perfume, or Pucha-pat, of the Hindoos; the odour is very peculiar, and even disagreeable to some people, but, in India, it is one of the commonest perfumes found in the bazaars.

P. plectranthoides (Plectranthus-like). *fl.* white, sub-secund, glomerately spicate; calyx and bracts coloured at top, villous; spikes ovate-cylindrical, pedunculate, panicled. July. *l.* ovate, cuneated or rounded at base, doubly serrated; cauline ones 2in. to 3in. long; upper ones small; uppermost bract-like. Stem 2ft. to 3ft. high; branches obtusely tetragonal. East Indies. Stove shrub. (B. M. 3238.)

POINCIANA (named after M. de Poinci, Governor of the Antilles in the middle of the seventeenth century, and a patron of botany). Flower Fence. ORD. *Leguminosæ.* A genus consisting of only three species of stove, evergreen, unarmed trees, natives of the warmer parts of Eastern Africa, the Mascarene Islands, and the Western Provinces of India. Flowers orange or scarlet, showy, corymbosely racemose at the apices of the branches; calyx segments valvate; petals five, orbiculate, imbricated; stamens ten, free. Pods elongated, flat, compressed, hard, two-valved. Leaves bipinnate; leaflets small, numerous; stipules inconspicuous; bracts small, very caducous. For culture, *see* **Cæsalpinia.**

P. pulcherrima (very pretty). *fl.* on very long pedicels; petals orange-yellow, rarely red, 1in. long, exceeding the calyx, often lacerated on the margins; racemes terminal, pyramidal. July. Pods flat-compressed, 4in. to 5in. long. *l.*, pinnæ three- to nine-jugal; leaflets five- to ten-jugal, ½in. long, oblong or spathulate-oblong, rounded or sub-truncate at the mucronulate tip. *h.* 10ft. to 12ft. West Indies, &c., 1691. Prickly shrub. (B. M. 995.) *Cæsalpinia pulcherrima* is the correct name of this shrub.

P. regia (royal). Royal Peacock Flower. *fl.* bright scarlet, in loose racemes, terminal, and from the axils of the upper leaves; petals almost orbicular, spreading, reflexed, tapering into long claws, veined on the upper side, and dashed with yellowish lines above the base; upper petal variegated and striated with red and yellow; stamens ten; filaments red; pedicels alternately patent. Summer. Pods about 4in. long. *l.* broadly ovate, 2ft. long, very patent, abruptly bipinnate, with from eleven to eighteen pairs of horizontally patent pinnæ, which are 4in. long; pinnules oblong, blunt, on very short petioles; base of common petiole fleshy. Trunk erect, 3ft. in diameter. *h.* 30ft. to 40ft. Madagascar. A magnificent tree. (B. M. 2884.)

POINSETTIA. Included under **Euphorbia** (which *see*).

POIRETIA (named in honour of J. L. M. Poiret, a French botanist and traveller in Barbary, about 1785). SYN. *Turpinia* (of Persoon). ORD. *Leguminosæ.* A genus of five species of twining or rarely sub-erect, gland-dotted, stove, perennial herbs or sub-shrubs, natives of South America, mostly Brazil, one extending to Central America and the warmer parts of Mexico. Flowers yellow, in small, axillary racemes, or paniculate at the tips of the branches; standard broadly orbiculate, reflexed; wings falcate-oblong. Pods linear. Leaves pinnate; leaflets four or rarely three, often minutely stipellate; stipules sessile or shortly decurrent at base. The species are little known in cultivation. For culture, *see* **Pictetia.**

P. scandens (climbing). *fl.*, racemes few-flowered, shorter than the petioles. *l.* with two pairs of obovate, retuse leaflets, full of pellucid dots. Stems climbing, glabrous. Caraccas, 1823. Herb. SYN. *Turpinia punctata.*

POIRETIA (of Cavanilles). A synonym of **Sprengelia** (which *see*).

POIRETIA (of Smith). A synonym of **Hovea** (which *see*).

POISON BERRY. A name applied to several species of *Cestrum.*

POISON BULB, ASIATIC. *See* **Crinum asiaticum.**

POISON OAK. *See* **Rhus Toxicodendron.**

POIS-PERDRIX. *See* **Heisteria.**

POITÆA (named after M. Poiteau, a French botanist, author of "Flore Parisienne," 1808-13). ORD. *Leguminosæ,*

Poitæa—*continued.*

This genus comprises only a couple of species of stove shrubs, natives of St. Domingo and Cuba. Flowers rose or purple, pendulous, in axillary racemes; pedicels solitary; standard obovate, erect; wings oblong, longer than the standard. Pods linear, flat-compressed, two-valved. Leaves impari-pinnate; leaflets many, membranous, entire, ex-stipellate; stipules setaceous. *P. galegoides* requires similar culture to **Sabinia** (which *see*).

P. galegoides (Galega-like). *fl.* rose-purple, and, as well as the pods, nodding. June. *l.*, leaflets twelve to fifteen pairs, ¼in. long, oblong, mucronate, and, as well as the branches, clothed with adpressed pubescence; petioles wingless. *h.* 1ft. St. Domingo, 1826.

POIVREA (named after P. Poivre, a French traveller and administrator, born at Lyons in 1719, died in 1786). ORD. *Combretaceæ.* A small genus of tropical and sub-tropical, stove, evergreen climbers, included, by Bentham and Hooker, under **Combretum** (which *see* for characters and culture).

P. coccinea (scarlet). *fl.* scarlet, loosely disposed, secund; panicles of many spikes. June to December. *l.* oblong-lanceolate, acute, dark green, shining. Madagascar, 1818. SYN. *Combretum purpureum* (B. R. 429).

P. grandiflora (large-flowered). A synonym of *Combretum grandiflorum.*

POKE or **POKE WEED.** *See* **Phytolacca.**

POLANISIA (from *poly*, many, and *anisos*, unequal; in allusion to the numerous and unequal stamens). ORD. *Capparideæ.* A genus (now merged into *Cleome*) comprising about fourteen species of pretty, hardy, annual herbs, often glandular and strong-smelling, mostly tropical and sub-tropical, one being an inhabitant of all the warmer regions of the globe. Sepals lanceolate, free or connate at base, deciduous; petals sessile or unguiculate, entire, equal or unequal, imbricated. Leaves simple or three to nine-foliolate; upper ones bract-like. Seeds should be sown in a hotbed frame, and turned out into a sheltered position in the open border, about the middle of May.

P. Chelidonii (Chelidonium). *fl.* rose; stamens twenty-four to thirty-two. June. *l.* seven to nine-foliolate; leaflets obovate-cuneate. *h.* 1½ft. East Indies, 1792. Plant hispid-pilose.

P. dodecandra (twelve-anthered). *fl.* white; stamens eight to twelve. June. *l.* trifoliolate: leaflets glabrous, elliptic-lanceolate, slightly serrulate. *h.* 1½ft. East Indies, 1795. Plant scabrous-puberulous.

P. graveolens (strong-smelling). *fl.* small; calyx and filaments purplish; petals yellowish-white; stamens eight to twelve. June to August. *l.* with three oblong leaflets. *h.* 1½ft. North America. Plant glandular-pilose.

POLEMANNIA. A synonym of *Dipcadi.*

POLEMONIACEÆ. A natural order of glabrous, pubescent, or slightly viscid, erect or twining herbs, rarely shrubs, the majority of which are found in (mostly Western) North America and the Andes of South America, a few being natives of Europe and temperate Asia. Flowers variously coloured, hermaphrodite, usually showy, regular or scarcely oblique, at the tips of the branches, or sometimes solitary or twin in the axils, sessile or stalked, sometimes corymbose-cymose, capitate, or loosely paniculate; calyx campanulate or tubular, five-fid, with imbricated lobes, or rarely three to five-fid or valvate; corolla gamopetalous, funnel-salver or bell-shaped, or rotate, the limb of five twisted lobes; stamens five, alternate with the corolla lobes. Fruit a capsule. Leaves alternate or opposite, entire or variously dissected. "In some countries, the leaves of *Polemonium cæruleum* are applied to ulcers following contagious diseases, and the Russians give a decoction of it in cases of hydrophobia" (Decaisne and Le Maoût). The order comprises eight genera and not more than 150 species. Well-known illustrative genera are: *Collomia*, *Gilia*, *Phlox*, and *Polemonium.*

POLEMONIUM (an ancient Greek name, used by Dioscorides, from *polemos*, war; of doubtful application). ORD. *Polemoniaceæ.* A genus comprising eight or nine

Polemonium—*continued.*

species of ornamental, tall or dwarf, hardy, perennial or rarely annual herbs, natives of Europe, temperate Asia, North America, Mexico, and Chili. Flowers blue, violet, or white, generally showy; calyx campanulate, five-fid; corolla shortly funnel-shaped, broadly campanulate, or sub-rotate, with obovate lobes; cymes terminal, loosely corymbose or sub-capitate. Leaves alternate, pinnatisect. Rhizomes usually creeping, thick or slender. The best-known species are described below. They are all perennials, and are of easy cultivation in any good garden soil, but flourish best in a deep, rich, and well-drained loam. Propagated very readily by division.

FIG. 213. FLOWERING STEM OF POLEMONIUM CÆRULEUM.

P. cæruleum (blue).* Charity; Greek Valerian; Jacob's Ladder. *fl.* normally blue, erect, corymbose, with roundish-oval, obtuse petals. Early summer. *l.* pinnate; leaflets ovate-lanceolate, acuminate, glabrous. Stem glabrous, angular and fistular. *h.* 2ft. Northern hemisphere (Britain). An elegant border perennial, of which there are numerous varieties, varying chiefly in the colour of the flowers. See Fig. 213. (Sy. En. B. 922.) A handsome form is that having variegated foliage and white flowers.

P. c. dissectum (dissected). *l.* bipinnate; leaflets petiolate, pinnatifid; segments linear. (S. B. F. G. 182, under name of *P. sibiricum*.)

P. confertum (clustered).* *fl.* rich blue, funnel-shaped, about ½in. across, clustered on the ends of the stalks. Summer. *l.* linear, pinnate; pinnæ very numerous and overlapping, varying from roundish-ovate to linear-oblong. *h.* 6in. Rocky Mountains, &c., 1885. See Fig. 214. (G. C. n. s., xxiv. 3.)

P. humile (dwarf).* *fl.* blue or purplish, in drooping, sub-corymbose panicles; segments of corolla ovate, acutish. July. *l.*, leaflets ovate, obtuse, mostly radical, and with a faint smell of musk. Stems many, leafy, downy. *h.* 6in. Rocky Mountains, 1827. SYNS. *P. Richardsonii* (B. M. 2800) and *P. villosum* (S. B. F. G. 266).

P. h. pulchellum (pretty). *fl.* smaller than in the type: corolla lobes violet or lavender-blue, in some forms nearly white, only two to three lines long. *l.*, leaflets often nearly glabrous and naked SYN. *P. pulcherrimum* (B. M. 2979).

FIG. 214. POLEMONIUM CONFERTUM, showing Habit and detached Flower.

P. mexicanum (Mexican). *fl.* blue, few, corymbose; corolla sub-rotate-campanulate. April. *l.* pinnate, downy; segments ovate or oblong. Stem loosely branched. *h.* 9in. North America, 1827. Plant viscous-pubescent. (B. R. 460.)

P. pulcherrimum (very pretty). A synonym of *P. humile pulchellum*.

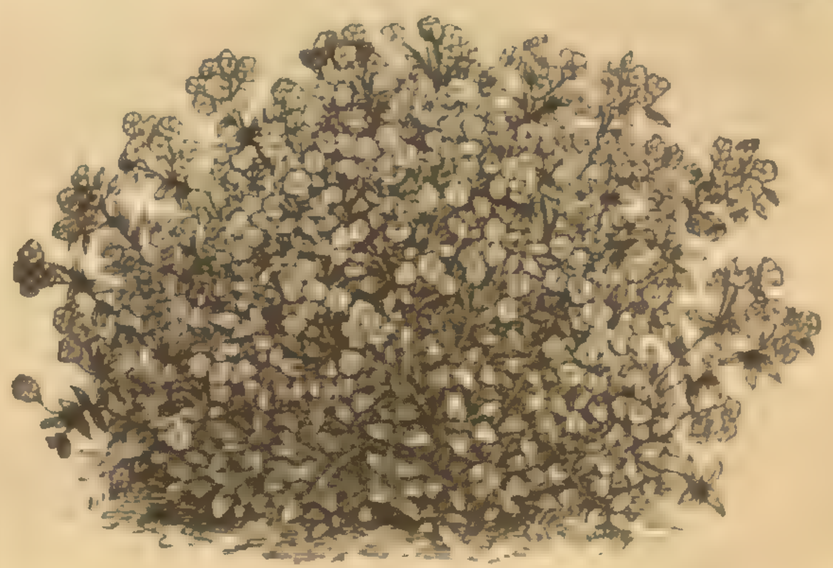

FIG. 215. POLEMONIUM REPTANS, showing Habit and Portion of detached Inflorescence.

P. reptans (creeping).* *fl.* blue, sometimes white, drooping, disposed in a loose, panicled corymb; segments of corolla cuneate. April. *l.* pinnate; leaflets seven to eleven, ovate, acute, glabrous. Stems leafy, glabrous. Root creeping. *h.* 6in. North America, 1758. See Fig. 215. (B. M. 1887.)

P. Richardsonii (Richardson's). A synonym of *P. humile*.

P. villosum (villous). A synonym of *P. humile*.

POLIA. A synonym of *Cypella*.

POLIANTHES (name given by Linnæus, probably from *polios*, white, and *anthos*, a flower; alluding to the colour of the blossoms). Erroneously spelt *Polyanthus*.

Polianthes—*continued.*

Tuberose. ORD. *Amaryllideæ*. A monotypic genus. The species is a splendid, half-hardy, bulbous plant. Tuberoses may be had in flower throughout the greater part of the year by potting successional batches of bulbs. They are imported at the latter end of the year, but a portion may be kept for successions. Loam, with a little manure or leaf mould intermixed, is a suitable compost, and 5in., or at the most 6in., pots are large enough. The bulbs may be inserted singly or three in a pot, and plunged at once in a bottom heat of from 60deg. to 70deg.; water should be withheld until the leaves appear, unless the soil becomes very dry; afterwards, it may be given freely. The flowers are pure white, and very highly perfumed; when detached singly, they are very useful for buttonhole and other bouquets. As the plants naturally grow tall, they should be kept in a light position, to induce them to keep as dwarf as possible. They will succeed during summer in any cool house, or may be planted in an open border. The bulbs are not usually kept after one year.

P. tuberosa (tuberous).* *fl.* white, delightfully fragrant, showy, disposed in a long, terminal, simple raceme; perianth funnel-shaped and incurved; stamens affixed at the throat. Autumn. *l.* radical or on the lower part of the stem. Stem or rhizome short, tuberous, erect, simple. *h.* 3ft. to 4ft. Mexico (cultivated in American, Asiatic, and European gardens), 1629. (B. M. 1817; B. R. 65.) The double-flowered form is that principally grown. There are several varieties, such as DOUBLE AFRICAN, DOUBLE AMERICAN, DOUBLE ITALIAN, and PEARL, and, of these, the last-named is most preferable, it being not so tall in growth as the others.

POLISH JUNIPER. *See* **Juniperus communis cracovia.**

POLIUM. Included under **Teucrium** (which *see*).

POLLEN. The coloured dust found in all mature flowers, except the few that are entirely female. It is found in the anthers, or thick heads of the stamens, and is set free, in the form in which it is best known, by the bursting of the walls that surround the spaces in which it is formed, and in which it is retained till ripe. In order to render this account of Pollen more clear, it is necessary to give a short account of the development and structure of anthers. The anther is the essential part of each stamen. In most cases, it is supported on a stalk or filament. It is at first made up of a mass of small cells, almost alike in form and size; but changes go on during its growth, and, when mature, one can recognise in it the various structures described below. The whole anther is covered with an outer layer of cells known as the epidermis. In the centre lies a column of thin-walled cellular tissue, called the connective, with a fibro-vascular bundle in the middle of it. At each side of this are two spaces or loculi, in which lie the Pollen grains till the spaces burst. Each is lined by a thin, dark layer of disorganised cells, known as the endothecium. Between these and the epidermis lies a tissue, known as the mesothecium, generally composed of several layers of cells. These cells, called "fibre cells," are usually peculiar in having the walls thickened with deposits, variously arranged in spirals, rings, networks, arches, and several other figures. The fibre cells are usually absent in a line near the thin partition between the loculi on each side; and the wall of each space is weakest where they are absent. Hence, when the spaces burst from pressure exerted on the walls of each in growth, the opening usually forms along the lines left unstrengthened. The amount and arrangement of the fibre cells vary greatly in different anthers, and the modes of bursting vary in agreement with these.

The Pollen grains are formed in the loculi as follows: In each of four places in the young anther, a group of cells becomes different from those lying around them in the larger size of the individual cells, which form others in the ordinary method by division. At last, a

Pollen—*continued.*

considerable number is formed, and they are called the "parent cells of the Pollen." In each parent cell, the contents group themselves together, and form four cells, the Pollen grains. There are differences in detail in different plants in the development of Pollen; but the usual course is that the walls of the mother cell waste away, and, it is believed, assist to nourish the grains, and to form the spines on the exterior of many kinds of Pollen. The Pollen grains at last lie in the loculi like a powder. The endothecium is, at first, a layer of thin-walled cells, with abundance of protoplasm; but the Pollen is nourished, in part, at the expense of these cells also; and there remains, to indicate its former existence, only the thin layer already noticed.

Pollen grains are usually free, but, in many plants, development seems arrested early; *e.g.*, in Heaths, the four cells developed from each "parent cell" remain united together. In some Acacias, the Pollen grains are made up of from eight to thirty-two united cells. In Orchids, the grains in each loculus often stick together in pyriform masses, called pollinia. These peculiarities are the result of incomplete solution of the walls of the parent cells, since these remain and bind the Pollen grains together. The grains possess two coats

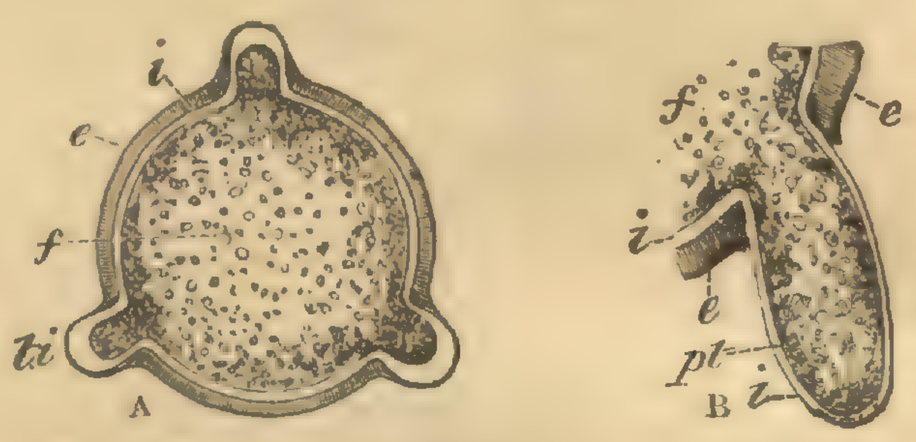

FIG. 216. POLLEN OF EPILOBIUM ANGUSTIFOLIUM.

A, Section of Pollen Grain—*e*, Extine; *i*, Intine; *ti*, Thick Intine; *f*, Fovilla. B, Growing Point of Pollen Grain—*e*, *e*, Extine; *i*, *i*, Intine; *f*, Fovilla; *pt*, Pollen Tube.

(extine and intine) (see Fig. 216, A). The inner consists of cellulose, is, in general, thin, and can be stretched, especially so in the form of a tube (see Fig. 216, B), protruded from the grain, when it lies on the stigma of the same species of plant, or is placed in a drop of weak solution of sugar. There are no openings in this coat. The outer coat differs from the inner, inasmuch as it is not extensible, and consists of a substance like cuticle in its chemical composition. This coat is entirely absent from the Pollen grains of *Zostera*, and of a few other plants that flower under water. It is occasionally uniformly spread all over the grain, and must be burst off before the Pollen tube can be protruded; but, in general, it is pierced by pores, or slits, of definite form and number for each species of plant. Through these openings one or more Pollen tubes are pushed when conditions favour their growth. The surface of the extine is smooth in many Pollen grains, but in most it bears characteristic outgrowths in the form of ridges, *e.g.*, in many *Compositæ*, or of spines, *e.g.*, in Mallow, Mistletoe, or of granules, as in many Dicotyledons. The nature of the surface in different Pollen grains is closely connected with the modes in which the Pollen is conveyed from the anthers to the stigma (*see* **Pollination**). In form, the Pollen grains differ very greatly in different plants. The most common forms are spherical, and oval with rounded ends; but many others exist, such as cubical, triangular, cylindrical, and polygonal. The form seems rather constant within the limits of genera, but varies greatly within certain families. Hence, the form of Pollen grains is of little value as an indication of affinities between plants,

Pollen—*continued.*

beyond genera; nor does similarity of form of grain necessarily indicate affinity. *Zostera* possesses one of the most curious forms, the grains in this plant being long, and extremely slender and thread-like. The colour, in most plants, is some shade of yellow, but in some it is deep orange (*Lilium tigrinum*), or red (*Verbascum*), or blue (*Scilla*), or deep purple, approaching black.

The contents of the grain are known as the fovilla. They consist of viscid protoplasm, full of small starch granules and oil-drops. Amidst this mass, in general, lie two bodies, like nuclei, the nature of which has been made clear, by the researches of Elfving and of Strasburger, within the past few years, and is most easily understood if we look to the Pollen of *Coniferæ*. In the Scotch Fir, the very light Pollen has the outer coat prolonged into two outgrowths containing air, which render the grain light. There is comparatively little difficulty in making out that there are three cells contained within the large cell seen in the middle, and the multicellular nature of the grain remains evident throughout its existence in the Fir.

In other *Coniferæ*, *e.g.*, the Yew, the Pollen is egg-shaped, and there is a small part cut off by a partition at the smaller end, rendering the grain two-celled; each cell has a nucleus. In Monocotyledons and Dicotyledons, the structure is less easily traced. In some (*e.g.*, in Pollen grains of Orchids), a small part at one angle of the cell contents becomes separated from the rest, (though a cell wall does not form between), and is called the "vegetative cell." It draws itself away from the side wall, and becomes imbedded in the contents of the large cell. For a time, it remains different in form from the nucleus of the large cell, but ultimately it becomes quite like that nucleus, so that there seem to be two nuclei. The vegetative cell, in many Pollen grains, breaks up into two or more cells, and, in some (*e.g.*, *Scirpus palustris*), the process becomes quite complex. When the Pollen tube is formed, the nucleus and the vegetative cell, or cells, pass into it, and have been traced into the end of it that passes down the micropyle and comes into contact with the helper cells (*see* **Ovule**). It is supposed that they perform some very important function in the formation of the embryo. The formation of the vegetative cells in the interior of the Pollen grains is generally regarded as representing the formation of the male prothallium in such Cryptogams as *Selaginella*. *See* **Prothallium**.

POLLICARIS. The length of the terminal joint of the thumb; 1in.

POLLICHIA. A synonym of **Trichodesma** (which *see*).

POLLINATION. The dusting of the stigma of a flower with pollen grains, as distinguished from fertilisation, or the action of the pollen upon the ovule, which gives rise to the development of the seed containing an embryo. Pollination must precede fertilisation. It is effected in very different ways in different flowers, and the agents by which it is effected are manifold. The more important of these are here indicated; but the account must be brief, though volumes have been written upon the subject of Pollination. Full information of the present state of our knowledge of the matter will be found in Dr. H. Müller's "Fertilisation of Flowers," translated by Prof. W. D'A. Thompson; Darwin's "Fertilisation of Orchids;" and Kerner's "Flowers and their Unbidden Guests," translated by Dr. Ogle. Sir John Lubbock's "British Wild Flowers in Relation to Insects" contains much interesting information regarding the subjects indicated in the title. There are also many shorter works and articles upon Pollination published in most European languages of late years. A list of these, compiled by

Pollination—*continued.*

Prof. Thompson, is included in Müller's work referred to above, and includes almost all published up to 1883.

The method of Pollination varies with the structure of the flower. In those plants in which the pollen and the ovules of the same flower ripen simultaneously, the pollen may be transferred directly from the anthers to the stigma either by the parts lying in contact, or by their lying in such a position that the pollen falls from the anthers upon the stigma. In cleistogamous flowers, or those (*e.g.*, in Sweet Violets, Wood Sorrel) which, in certain plants, are formed in summer and autumn, and never open, but yet are often more productive of seeds than the conspicuous flowers, the pollen, while in the anthers, pushes pollen tubes to the stigma, which is thus Pollinated. In by far the greater number of hermaphrodite flowers, even of those in which the pollen and the stigma mature simultaneously, the pollen is prevented from falling upon or reaching the stigma by the arrangement of the parts. Necessarily, in those hermaphrodite flowers in which the pollen and the stigma do not mature simultaneously, the pollen cannot reach the stigma of the same flower (*see* **Proterandrous** and **Proterogynous**). In all these cases, the pollen must be transferred from the anthers to the stigmas by some agency from outside the flower; and this must be so yet more evidently in the case of unisexual flowers, whether male and female flowers be on the same plant or on different ones. The chief agents that effect Pollination in British plants are wind and insects. A few plants are adapted for conveyance of pollen by currents of water; and, in the tropics, humming-birds, and certain other birds, probably aid materially. It is unnecessary to refer further to these latter agencies, since they would probably not come under notice in gardening operations at all in the British Islands. Plants suited for fertilisation by wind are usually called "anemophilous," or wind-lovers (from *anemos*, the wind, and *phileo*, I love). Those adapted to have the stigmas Pollinated by insects, are called "entomophilous," or insect-lovers (from *entomon*, an insect, and *phileo*, I love). They differ from one another so widely that a practised observer can conjecture almost with certainty to which group any flower would belong, though previously quite unacquainted with the flower. The more distinctive characters of the two are as follows: Anemophilous flowers are seldom large or conspicuous individually; the sepals and petals are small, usually regular, often absent, or reduced to one row of small, scaly bodies (*e.g.*, Oak); they seldom contain nectar, or afford other attractions for insect visitors; the stamens have long filaments, with versatile anthers, that turn with the least breath of wind, and thus shed readily the loose, powdery, smooth pollen, which is often produced in very great amount. The grains are very light, and are occasionally (*e.g.*, in Firs) rendered relatively lighter by means of dilatations of the outer coat filled with air. The stigma in such plants is usually furnished at the end (Pellitory) or along the sides (Grasses, &c.) with a quantity of long, simple or branched hairs, which frequently hang out beyond the perianth, or other coverings, *e.g.*, beyond the glumes in Grasses, and entangle the pollen grains when these are carried against them by the wind. Anemophilous plants are often social. Many trees under this group produce their flowers in spring, before the leaves, thus preventing great loss of pollen among the leaves, and favouring Pollination. Entomophilous flowers are the reverse of all this. They are almost always more or less individually conspicuous, with well-developed, coloured petals, and often also coloured sepals, or are crowded in showy masses. They are sometimes regular, but more generally are only bilaterally symmetrical—*i.e.*, they have the two sides alike, as in most Orchids and *Leguminosæ* (see

Pollination—*continued.*

Fig. 217). They very often have special structures, *e.g.*, spurs or other modifications of parts, to form or to store up nectar. They also possess a pleasant scent, and attract numerous insect visitors by the varied inducements they offer. Some insects (*e.g.*, Bees) also visit flowers to eat or to collect pollen, or to carry it away as food for their young progeny. Whatever the reason of

Fig. 217. Expanded Blossom of Pea—*v*, Vexillum; *al*, Alæ, with Carina between.

the visit, the insect generally becomes dusted with pollen, which it transfers to the stigma of the next flower of the same species that it enters. The pollen in entomophilous flowers is less abundant than in the anemophilous ones; and the grains very frequently bear ridges or spines, so as to stick more readily to the insect, or they are joined together in groups of four or more, as in

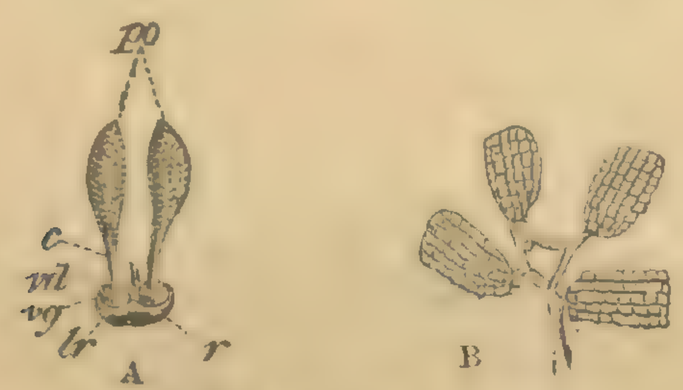

Fig. 218. Pollen of Orchid.

A, Pollen Masses, &c.—*po*, Pollinia; *c*, Caudicle; *vd*, Viscid Disk; *vg*, Viscid Globe; *r*, Rostellum; *lr*, Lip of Rostellum. B, Pollen Granules (much magnified), held in packets by thin, elastic threads.

Heaths and Orchids (see Fig. 218). The masses are furnished, in Orchids and a few other plants, with special contrivances to favour adhesion to the insect's body, and afterwards to place them in the best position to touch the stigma of the flower next visited (*see* **Orchid Fertilisation**). The stamens are usually inclosed in, or are not longer than, the perianth, and the anthers burst in such a way as to let free the pollen in the position most likely to insure its being dusted on to the insect. The stigma or stigmas do not often project beyond the perianth, and are generally small and rounded, or linear, down one side of the style. The surface is usually covered with a layer of erect cells, which secrete a viscid fluid, and in this the pollen grains are caught when any part of an insect's body dusted with them touches the stigmatic surface. The pollen grains absorb nourishment from this fluid, and are stimulated to emit pollen tubes between the cells of the stigma and down the tissues of the style to the ovules, to fertilise them.

Both anemophilous and entomophilous flowers are adapted to secure cross-fertilisation, or "allogamy"; while cleistogamous flowers, and a few others, are adapted for self-fertilisation, or "autogamy." Darwin and others have shown that allogamy secures the largest production of healthy seeds, and that the seedlings are stronger and healthier than when the stigmas are artificially fertilised with pollen from the same flower. The

Pollination—*continued.*

disadvantages of allogamy are that it entails on the plant a greater production of pollen, as by far the greater part never reaches a stigma; and, even with this, many stigmas may remain unpollinated, and no seeds be produced in these flowers. Moreover, such flowers as have been specially adapted for fertilisation by a certain kind, or kinds, of insects, may, in absence of these agents, remain unpollinated and barren. This occurs with certain greenhouse plants, which are fertile if Pollinated artificially, but, without human aid, remain barren, *e.g.*, various Orchids. Under **Nectary** and **Orchid Fertilisation** several adaptations of flowers to benefit by visits of insects will be found discussed, and only one or two examples need here be added to those referred to under the above headings. By far the most interesting examples of adaptations for Pollination of the stigmas with pollen from another flower, are met with among entomophilous flowers. Many of these are suited to benefit by the visits of Beetles, Sawflies, and other insects, which do not possess a long proboscis; hence, the nectar or pollen that attracts them is situated almost on the surface, or, at least, is easily accessible,

Fig. 219. Strawberry Plant in Flower, showing the numerous short Stamens, readily accessible to Insects.

e.g., in the Strawberry (see Fig. 219). Such flowers may have the pollen transferred from the anthers to the stigma of the same flower; but this is, in general, prevented by the pollen and the stigmas not maturing simultaneously (dichogamy), or by the direction in which insects usually move on flowers, causing them to touch the stigmas *before* they touch the pollen. Flowers of this kind are often small individually, but are grouped into conspicuous masses, *e.g.*, in *Umbelliferæ* and *Compositæ*; and, in such cases, the outer flowers often differ much from the inner in the inflorescence. This difference is extreme in such plants as the Guelder Rose (*Viburnum Opulus*), and in *Hydrangea*, where the outer flowers have the perianth large and showy, but the sexual organs abortive, and the inner flowers are small, but sexually perfect, except in such garden varieties as have all the flowers rendered showy and barren.

But even among open and regular flowers examples occur in which very perfect adaptations for cross-pollination are present. *Kalmia latifolia* (see Fig. 220) may be selected as an example. In this plant, the style rises in the middle of the flower, bearing the small stigma on its tip. There are ten stamens, curved as shown in the figure, so that the anthers are situated each in a small pouch in the corolla. In these pouches they remain till the filaments are touched with a little force, and, if the

Pollination—*continued.*

flowers are protected under net or glass, they wither and fall without the anthers getting free or the stigma being Pollinated, and the flowers remain barren. But, in the natural condition, the flowers are freely visited by various Bees, and other insects, which usually alight on the style, and, in sucking the nectar, come into contact with the filaments, and set free the anthers one by one. The filaments straighten themselves, and the pollen

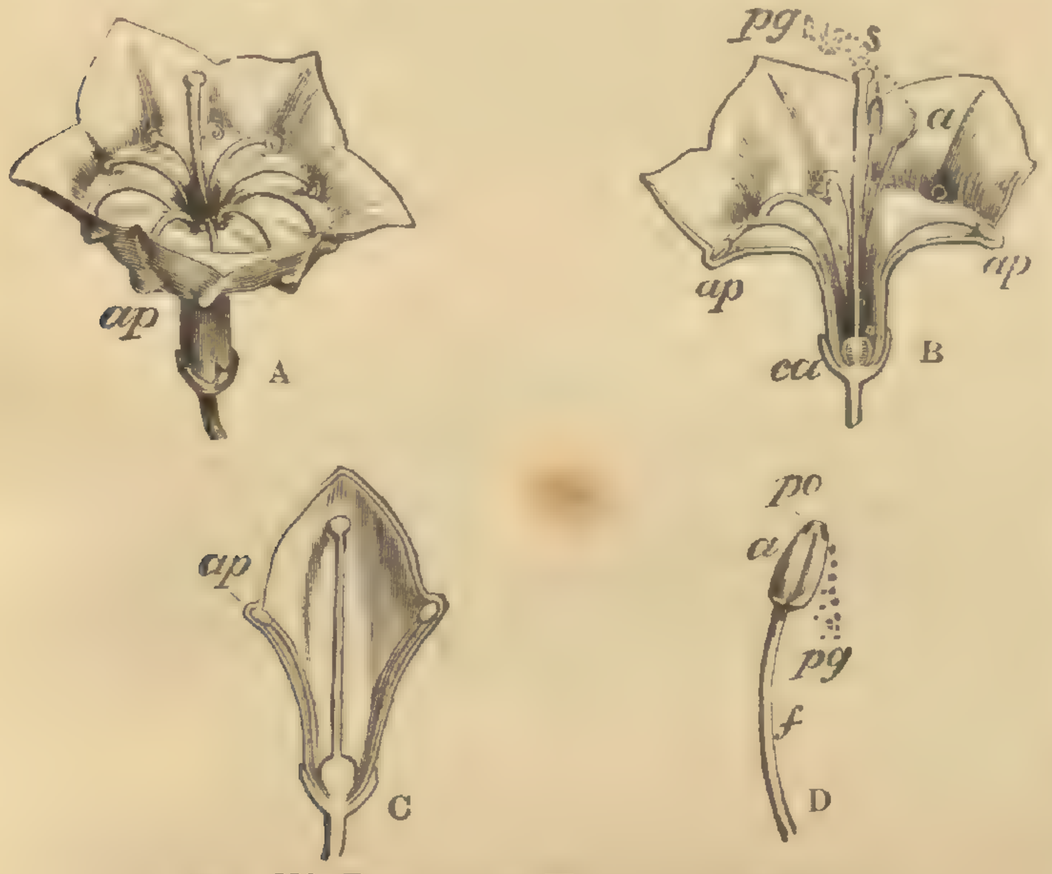

FIG. 220. DETAILS OF KALMIA LATIFOLIA.

A, Expanded Flower—*ap*, Anther Pocket. B, Section of Expanded Flower—*ap*, *ap*, Anther Pockets; *s*, Stigma; *a*, Free Anther; *pg*, Pollen Grains in Shower; *ca*, Calyx. C, Section of Flower Bud—*ap*, Anther Pocket. D, Stamen, more enlarged—*a*, Anther; *po*, Pores; *pg*, Pollen Grains; *f*, Filament.

is thrown out of the anther, from two small holes at the tip (see Fig. 220, D), against the insect's body, to be thus transported to the stigma of another flower. Such flowers as characterise the *Labiatæ*, the *Orchideæ*, and the papilionaceous *Leguminosæ*, in possessing bilateral symmetry, are among the peculiarly entomophilous types, especially when the nectar is so placed as to be accessible only to insects possessed of a long proboscis,

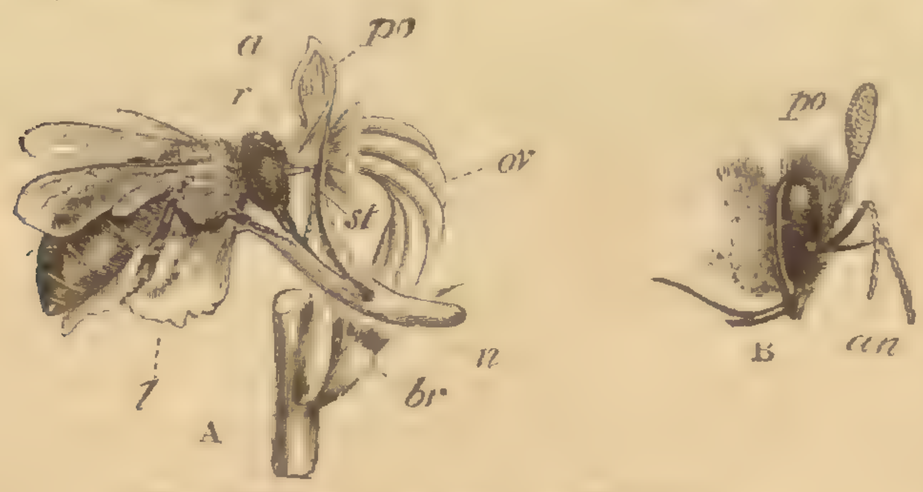

FIG. 221. POLLINATION OF ORCHID.

A, Flower of *Orchis Morio* (Sepals, two Petals, and side of Spur removed), with Hive Bee sucking Nectar—*a*, Anther; *po*, Pollinium; *r*, Rostellum; *st*, Stigma (side view); *l*, Labellum; *ov*, Ovary; *n*, Nectary; *br*, Bract. B, Head of Bee, carrying (*po*) Pollinium—*an*, Antennæ.

e.g., Bees (see Fig. 221). In addition to this, in some *e.g.*, in *Antirrhinum* (see Fig. 222), the corolla is closed by the lower lip, which is pressed against the upper one, and excludes all but insects heavy enough to depress it, *e.g.*, Humble Bees. In the strictly entomophilous flowers, very striking adaptations to favour the visits of insects of certain groups, or even of certain species, and to exclude other insects, are often met with. But the field is so wide, that to give examples would far exceed the

Pollination—*continued.*

space here available. Readers are therefore referred to the works noted above, and their attention is called to a subject of the utmost interest in itself, and of great practical value in its relations to hybridising

FIG. 222. FLOWER OF ANTIRRHINUM ORONTIUM.

plants, and to the development of new races of value for their beauty, or for other properties suited to commend them to gardeners and to amateurs.

POLLINIA. Pollen-masses.

POLY. In Greek compounds, this signifies numerous; *e.g.*, Polycotyledonous, having several cotyledons.

POLYACTIDIUM. Included under *Erigeron*.

POLYADELPHIA. A Linnæan artificial order, characterised by having stamens in several phalanges.

POLYALTHIA (from *polys*, much, and *althecis*, healthy; alluding to supposed properties of the plant). ORD. *Anonaceæ*. A genus comprising about thirty species (including twenty-five which are sometimes classed with *Guatteria*) of stove or greenhouse trees or shrubs, natives of tropical Asia, one being Australian. Flowers solitary or fasciculate, axillary or opposite the leaves; sepals three, valvate or rarely loosely imbricate; petals six, bi-seriately valvate, flat, almost equal, ovate or narrow. Leaves oblique, penniveined. The two species described below are the only ones worth mention. They are stove trees. For culture, *see* **Guatteria.**

P. cerasoides (Cherry-like). *fl.*, peduncles axillary, solitary; petals nearly equal. *l.* lanceolate, acute, pubescent beneath. *h.* 60ft. East Indies, 1820.

P. suberosa (corky-barked). *fl.*, three outer petals greenish, the three inner ones whitish; peduncles nearly opposite the leaves, one-flowered. *l.* oblong, acute, smooth. *h.* 30ft. India, 1820.

POLYANDRIA. A Linnæan class, having flowers with an indefinite number of stamens.

POLYANTHES. A synonym of **Polyxena** (which *see*).

POLYANTHUS. A garden race of *Primula*, probably derived from a cross between the Primrose and Cowslip. The Polyanthus has been in cultivation for many years, and has proved itself one of the most popular of florists' flowers. The attention, however, now bestowed on it is much less than at an earlier period of its history, and the varieties raised are far less numerous. Good varieties, that were once procurable, are now lost to cultivation, and those of the present day are not generally considered of equal merit—at least, for exhibition purposes. As a hardy garden plant, the Polyanthus is likely to remain a favourite, and deservedly so, for planting on rockeries, in mixed borders, and in spring flower-beds. The vigorous-growing varieties, which may be readily raised from seed, are admirably adapted for naturalising in pleasure-grounds along the sides of walks, &c. Florists' rules regarding the flowers of a Polyanthus, and the recognised qualities exhibited in them, are very rigid; it is, however, unnecessary to follow them too closely, unless the flowers are required for exhibition. For the last-named purpose, the section known as Gold-laced is most favoured; the

Polyanthus—*continued.*

flowers are distinguished by having a clear, even margin, or lacing, of gold, then a ground or body-colour, similarly well defined, with a stripe passing through the centre of each division to the eye. The pip, as a single flower is termed, should be large, flat, and round, with the exception of five or six small divisions on the margin.

For general garden decoration, any quantity of seedlings with beautiful flowers may be raised without the florists' conventional rules being adhered to. Seeds should be sown in June, or so soon as they are ripe; they germinate quickly at this season, and form flowering plants by the following spring: if kept in store until spring, a season will be lost. In summer, a prepared border outside is best for the seed; in spring, shallow boxes and a free, sandy soil should be used under glass. When once established, Polyanthuses grow in any ordinary garden soil; but they succeed best where it is rich, and the position somewhat moist and partially shaded. It is important that seeds be saved only from the best flowers procurable, or be obtained from a separate reliable source, as the varieties soon deteriorate, even as ornamental plants, if this is not attended to.

Polyanthuses for exhibition are grown in pots and in cold frames, under treatment somewhat similar to that accorded Auriculas. The season for potting or repotting is August, and a good compost would consist of two parts loam to one of leaf mould and decayed manure. A top-dressing of good soil is recommended in February, particularly for plants that have not been repotted the previous autumn. In addition to propagating from seeds, Polyanthuses may be readily increased by divisions. Good varieties grown in pots may have their side-shoots removed when the annual potting takes place in August; and any that are grown in the open ground, can be readily divided in the autumn, when they are planted out.

Besides the Gold-laced varieties of Polyanthus already referred to, there are others designated respectively Fancy and Hose-in-Hose. Fancy varieties are of various hues, the plants being very floriferous, and of vigorous habit; and some of the Hose-in-Hose flowers are curious and very uncommon. All succeed under similar treatment.

POLYANTHUS. *See* **Polianthes.**

POLYANTHUS NARCISSUS. *See* **Narcissus Tazetta.**

POLYBÆA. A synonym of **Cavendishia** (which *see* under **Proclesia**).

POLYBOTRYA. Included under **Acrostichum** (which *see*).

FIG. 223 POLYCALYMMA STUARTII, showing Habit, detached Flower-head, and Leaf.

POLYCALYMMA (from *poly*, many, and *kalymna*, a covering; in allusion to the numerous series of involucral bracts). ORD. *Compositæ*. A monotypic genus, now included, by Bentham and Hooker, under *Myriocephalus*. The species is a glandular-puberulous, half-hardy, perennial herb, requiring similar treatment to **Centaurea** (which *see*).

P. Stuartii (Stuart's). *fl.-heads* white, depressed-hemispherical, 1in. or more in diameter; florets many, ¼in. long; outer involucral leaflets ¼in. long. *l.* alternate, sessile, elongated-linear, flat, 3in. to 4in. long, ⅛in. broad; uppermost ones scarious, white. Stems fistular, striated, 1ft. or more long. Australia. See Fig. 223.

POLYCAMPIUM. Included under **Polypodium** (which *see*).

POLYCARPÆA (from *poly*, many, and *karpos*, a fruit; alluding to the numerous seeds). SYNS. *Hagæa*, *Lahaya*, *Mollia*, *Polycarpia*. ORD. *Caryophylleæ*. A genus comprising about two dozen species of greenhouse or hardy, annual or perennial, erect or rarely diffuse herbs, natives of tropical and extra-tropical regions, one being broadly dispersed over tropical America. Flowers often numerous, disposed in terminal, paniculate, effuse or contracted, sometimes capitate cymes; sepals five, white, rose, or purple, scarious; petals five, entire, bidentate, or rarely laterally denticulate. Leaves narrow-linear or rarely ovate, fasciculate, often pseudo-verticillate. The species are of easy culture in light, sandy loam. The annuals may be increased by seeds, sown on a hotbed, or in the open border, in spring; and the perennials by cuttings. The species are not much known to cultivation; those mentioned below are hardy.

P. aristata (awned). *fl.* white, in corymbose cymes. June and July. *l.* usually six in a whorl, linear-lanceolate; young ones silky, mucronated by an awn; old ones nearly glabrous, and almost awnless. *h.* 3in. to 6in. Canary Islands, 1780. Perennial.

P. gnaphalioides (Gnaphalium-like). *fl.* white, crowded into terminal, sub-capitate cymes. June and July. *l.* oblong, hoary-tomentose. Stems suffruticose, prostrate. North Africa, 1818. Perennial.

P. latifolia (broad-leaved). *fl.* white; cymes terminal, corymbosely capitate. June to August. *l.* obovate, mucronated by an awn; cauline ones usually six in a whorl, those of the branches opposite. Stems suffruticose, diffuse. *h.* 3in. Teneriffe, 1810. Perennial.

P. Memphitica (Memphitic). *fl.* white; petals quite entire; cymes terminal, few-flowered. July. *l.* usually six in a whorl, oval-oblong, narrowed into the petiole. Stems diffuse, branched, villous. *h.* 6in. Egypt, 1828. Annual.

POLYCARPA MAXIMOWICZII. A synonym of **Idesia polycarpa** (which *see*).

POLYCARPIA. A synonym of **Polycarpæa** (which *see*).

POLYCARPIC. Many-fruited; also, but less properly, fruiting many times.

POLYCHILOS. Included under **Phalænopsis** (which *see*).

POLYCYCNIS (from *polys*, many, and *kyknos*, a swan; referring to the lip and column, which, together, bear some resemblance to a swan). ORD. *Orchideæ*. A genus comprising about five species of stove, epiphytal orchids, closely allied to *Cycnoches* and *Mormodes*, natives of tropical America. Flowers rather large, pedicellate, in loose, floribund, often nodding racemes; sepals free, spreading, narrow; petals similar, or narrow and substipitate at base; lip affixed to the base of the column, sometimes biauriculate; column very long, slender, curved, resembling the neck of a swan. Leaves ample, plicate-venose, contracted into petioles. Rhizomes or scapes erect, few-sheathed, simple. For culture, *see* **Catasetum.**

P. barbata (bearded). This is correct name of plant described in this work as *Cycnoches barbatum*.

P. gratiosa (agreeable). *fl.* brownish-purple; raceme deflexed, drooping, many-flowered. Costa Rica, 1871. "This is a species in the way of *P. lepida*; yet it appears very distinct by the very short claw of the lip and the anterior part of the same organ" (Reichenbach). An elegant plant.

Polycycnis—*continued.*

P. lepida (neat). *fl.*, sepals and petals light brown, slightly tipped with yellow at the apex; lip light yellow, spotted with chocolate-brown, and white towards the apex; raceme drooping, from fifteen to twenty-flowered. Pseudo-bulbs about 2in. high, tapering, dark green. Columbia, 1870. A very pretty species. (I. H. ser. iii. 19.)

P. muscifera (fly-bearing). This is the correct name of plant described in this work as *Cycnoches musciferum*.

P. vittata (striped). *fl.* yellow, streaked with so much deep chocolate that the former colour is scarcely discernible on the lip, disposed in an erect raceme. *h.* 1ft. British Guiana, 1841. (B. R. 1841, 69, under name of *Houlletia vittata*.)

POLYDESMUS COMPLANATUS. *See* **Millipedes and Myriapoda.**

POLYGALA (the old Greek name used by Dioscorides, from *polys*, much, and *gala*, milk; in reference to its reputed quality of promoting the secretion of milk). Milkseed; Milkwort. Including *Chamæbuxus*, *Isolophus*, and *Senega*. ORD. *Polygaleæ*. An extensive genus (200 species have been described) of greenhouse or hardy, annual or perennial herbs, shrubs, or sub-shrubs, distributed over the temperate and warmer regions of the globe. Flowers sometimes showy, small, variable in colour; spikes or racemes terminal or lateral, rarely axillary, sometimes in contracted heads, rarely paniculate. Leaves alternate, or rarely opposite or verticillate. Only a comparative few of the species are now in cultivation. The hardy sorts are desirable subjects for borders and rockwork. The greenhouse species are fine and very distinct plants amongst the hard-wooded section. They are more easily grown than most others, and flower profusely each spring. Fibrous peat, with some silver sand intermixed, forms a suitable compost for Polygalas, which should be potted firm. Propagated, in spring, by cuttings of the young shoots, taken when about 3in. long, inserted in sandy peat, under a bell glass, placed in an intermediate temperature, and kept shaded.

P. Chamæbuxus (dwarf Box). Bastard Box. *fl.* cream-coloured or yellow, tipped with purple, fragrant; racemes axillary, few-flowered. Early summer. *l.* oblong-lanceolate, mucronate. Stem shrubby, branched, procumbent. *h.* 6in. Mountain woods in many parts of Europe, 1658. A very pretty, neat-habited, hardy sub-shrub. (B. M. 316.) *P. C. purpurea* is a handsome variety, dark brown, with purplish leaves. (Gn., Jan., 1878.)

P. Hilairiana (St. Hilaire's). *fl.* the largest of the genus; three outer sepals small, ovate; two inner ones corolloid, white, tinged with green and black; inner petals mostly combined into a tube, white; lateral ones sub-acute, rose-coloured at the apex; racemes six to ten-flowered. Spring. *l.* 4in. to 5in. long, oblong-ovate, sub-acute. Stem unbranched, erect, 1ft. high. Bahia. Greenhouse shrub. (B. M. 5257.)

P. myrtifolia grandiflora (Myrtle-leaved, large-flowered).* *fl.* rich purple; wings obliquely and broadly obovate; keel large, veiny; pedicels shorter than the flowers. April and May. *l.* on very short petioles, oblong or oblong-obovate, somewhat mucronate. *h.* 4ft. to 6ft. South Africa. A much-branched, greenhouse shrub. (B. M. 3516.) *P. Dalmaisiana* of gardens, a popular greenhouse plant, is either a form of *P. myrtifolia*, or a hybrid between it and *P. oppositifolia*.

P. oppositifolia (opposite-leaved).* *fl.* purplish, with a yellowish-green keel, in terminal, sub-corymbose racemes. *l.* opposite, cordate, ovate, acute. *h.* 3ft. to 4ft. Cape of Good Hope, 1790. Greenhouse shrub. (B. R. 636.)

P. o. cordata (heart-shape-leaved). *l.* broadly cordate, acute or acuminate. *h.* 3ft. Cape of Good Hope, 1791.

P. o. latifolia (broad-leaved). *l.* broadly ovate, cuspidate-acuminate. (B. R. 645.)

P. paucifolia (few-leaved). *fl.* of a fine purple colour, large, in threes, terminal, the keel crested. May to August. *l.* ovate. Stems very simple, erect, naked below. *h.* 3in. North America, 1812. Hardy herbaceous perennial. (B. M. 2852.)

P. Senega. Seneca Snake-root. *fl.* almost sessile; wings round-obovate, concave; crest short. May and June. *l.* lanceolate or oblong-lanceolate, with rough margins. Stems several, from thick and hard, knotty rootstocks, simple, 6in. to 12in. high. North America. Hardy perennial herb. (B. M. 1051; B. M. Pl. 29; L. B. C. 1380.)

P. virgata (twiggy). *fl.* purple or flesh-coloured, in long racemes. *l.* scattered, lanceolate or linear-lanceolate. Cape of Good Hope. Greenhouse shrub.

P. v. speciosa (showy). *fl.* purplish, with spreading pedicels, in loose racemes. May to October *l.* oblong-cuneate, obtuse, mucronate, upper ones linear, and, as well as the twiggy branches, glabrous. *h.* 6ft. Cape of Good Hope, 1814. A showy, greenhouse shrub. (B. M. 1780.)

P. vulgaris (common). Common Milkwort; Procession Flower; Rogation Flower. *fl.* varying in colour, blue, lilac, purple, pink, or white, about ½in. long, in terminal racemes. June. *l.* small, oblong or lanceolate, glabrous Stems prostrate or erect, numerous, slender. Europe, &c. (Britain). Perennial herb. (Sy. En. B. 185.)

POLYGALEÆ. A natural order of herbs or undershrubs, occasionally twining, or erect or climbing shrubs, rarely small trees, glabrous, tomentose or villous, dispersed over the temperate and warmer regions of the globe. Flowers hermaphrodite, irregular, solitary or centripetally spicate or racemose, rarely paniculate, axillary or terminal; sepals five, free, closely imbricated, the two inner ones larger, petaloid, wing-formed; petals three or five, hypogynous, the two lateral free or united at their base with the lower concave or galeate (keel), in the gamopetalous corolla split behind, rarely absent; upper two sometimes equal to the lateral, enveloping the keel in æstivation, sometimes small, scale-like, or absent; stamens eight, rarely five or four, above the middle monadelphous or rarely free, the outer ones often more or less connate with the petals; pedicels usually articulate at base, bracteate and bracteolate. Fruit a capsule, berry, or drupe. Leaves alternate or rarely opposite, simple, entire; stipules none. The species contain tonic and astringent properties. Several of the European Polygalas find a place in our Materia Medica as remedies for lung diseases; the root of *P. Senega* has a stimulating action on the pulmonary mucous membrane. The order includes fifteen genera and about 400 species. Illustrative genera are: *Monnina*, *Muraltia*, and *Polygala*.

POLYGONASTRUM. A synonym of **Smilacina** (which *see*).

POLYGONATUM (the old Greek name, used by Dioscorides, from *poly*, many, and *gonu*, a knee-joint; alluding to the numerously-jointed stem). Solomon's Seal. SYNS. *Axillaria*, *Evallaria*. ORD. *Liliaceæ*. A genus comprising (according to Mr. Baker) twenty-three species of pretty, mostly hardy, herbaceous, border plants, broadly dispersed over North temperate regions. Flowers nodding or pendulous, solitary in the axils, or frequently shortly and loosely racemose or sub-umbellate, on short peduncles; perianth marcescent, at length deciduous, with short, erecto-patent

FIG. 224. POLYGONATUM JAPONICUM, showing Habit and detached Flower.

lobes. Berry globose, pulpy. Leaves alternate, opposite, or whorled, ovate, lanceolate, or linear, in one species shortly cirrhose-acuminate at apex. The species, the best known of which are here described, are of very easy culture in a moderately good, loamy soil. They are all hardy, except where otherwise stated, and are admirably adapted for naturalising in woods and copses. *P. multiflorum*, the common Solomon's Seal, is a fine subject for forcing. The plants may be grown in the open ground all

Polygonatum—*continued.*

summer, and potted-up ready for forcing after the stems die down. The large, fleshy rootstocks may be placed rather thickly in 6in. pots, and, after flowering is over, transferred again to the open ground. Large quantities of Solomon's Seal are annually imported purposely for forcing; but it may be prepared at home, by providing a good soil, and planting each year according to the quantity required. Propagated easily by divisions.

P. biflorum (two-flowered).* *fl.*, perianth greenish, ¼in long; peduncles one to three, but mostly two, flowered. May. *l.* ovate- or lanceolate-oblong, nearly sessile, usually minutely pubescent, at least on the veins, pale or glaucous beneath. Stem slender, 1ft. to 3ft. high. North America.

P. japonicum (Japanese). *fl.* one to three in the axils, drooping; perianth ¾in. to ⅞in. long, with a white tube and green, deltoid teeth. April. *l.* ten to twelve, alternate, ascending, oblong, 2in. to 3in. long, acute, above obscurely glaucous, below distinctly so. Stem 1ft. to 1½ft. high. Japan. See Fig. 224

FIG. 225. POLYGONATUM MULTIFLORUM, showing Habit and detached Raceme.

P. multiflorum (many-flowered).* Common Solomon's Seal; David's Harp; Lady's Seal. *fl.* white; perianth about eight lines long, constricted in the middle; peduncles two to five-flowered. June. *fr.* bluish-black. *l.* alternate, 3in. to 5in. long, with very short petioles, oblong, stem-clasping. Stem 2ft. to 3ft. high, terete. Northern hemisphere (Britain). See Fig. 225. SYN. *Convallaria multiflora* (F. D. 152). There are two or three varieties of this very pretty plant; one, *flore-pleno*, has double flowers, and another, *striatum*, variegated leaves.

P. officinale (officinal). *fl.* white, having the perianth constricted at the base. *fr.* dark violet. *l.* ten to twelve, alternate, oblong, semi-amplexicaul. Stems about 1ft. high, angular. Northern hemisphere (Britain). SYNS. *P. vulgare*, *Convallaria Polygonatum* (F. D. 377).

P. o. macranthum (large-flowered). A very large-flowered form. *h.* 1ft. to 1½ft. Japan. (B. M. 6133.)

P. oppositifolium (opposite-leaved). *fl.* many, disposed in opposite corymbs; perianth tube white, beautifully ribbed with red; segments greenish; peduncles four- to ten-flowered. April. *fr.* scarlet. *l.* ten to twenty or more, oblong, acuminate, very shortly petiolate, all opposite. Stems 2ft. to 4ft. high. Himalayas, 1822. Greenhouse. (B. M. 3529, H. E. F. 125, and L. B. C. 610, under name of *Convallaria oppositifolia*.) The form *albo-vittatum* has red stems, and leaves striped with white.

P. punctatum (dotted). *fl.*, perianth tube white, lilac-dotted; segments greenish. May. *l.* twelve to twenty, ascendent, all opposite, rarely alternate, oblong-lanceolate, 2in. to 3in. long, cuneate at base, shortly petiolate, rigid. Stems 1ft. to 2ft. high, angular, sulcate. India, 1857. (B. M. 5061.)

P. roseum (rosy). *fl.* rose-colour, twin in the axils, on very short pedicels; perianth nearly ½in. long, with a cylindrical tube and short teeth. May. *l.* ascendent, linear or lanceolate, acuminate, sub-petiolate, 3in. to 5in. long; upper ones opposite or ternate; those at the tips of the stems whorled. Stems 2ft. to 3ft. high, sulcate. Central Siberia. (B. M. 5049.)

P. verticillatum (whorled). *fl.* greenish, rather smaller than those of *P. multiflorum*; perianth constricted in the middle; peduncle one to three-flowered. June. *fr.* red. *l.* whorled, sessile, lanceolate. Stem 2ft. to 4ft. high, angular. Northern hemisphere (Britain). SYN. *Convallaria verticillata* (F. D. 86).

P. vulgare (common). A synonym of *P. officinale*.

POLYGONEÆ. A very distinct natural order of herbs, shrubs, or sometimes trees, broadly dispersed; the arborescent species are nearly all tropical American,

Polygoneæ—*continued.*

the shrubs are mostly limited to the Eastern Mediterranean or Western Asiatic region, and the herbaceous kinds affect temperate and mountainous regions. Flowers hermaphrodite, or, in a few genera, unisexual, regular, usually rather small, springing from the axils of leaves or bracts (sometimes ochreiform), solitary or fasciculate, in racemes or spikes; perianth inferior, calycine or coloured, with four to six lobes or segments; stamens six to nine, rarely fewer, or many and indefinite; filaments filiform or dilated at base, free or connate in a ring at the base; anthers two-celled, often versatile; ovary trigonal or compressed, sessile or shortly adnate to the perianth at the base; pedicels frequently articulated. Fruit a nut, trigonal, compressed, or rarely quadrigonal, rarely naked, usually covered by the perianth. Leaves alternate or rarely opposite, variable in form, rarely lobed or divided; petioles usually more or less dilated and stem-clasping. One of the most important products of the order is Rhubarb (*Rheum officinale*). Buckwheat, Sorrels, and Docks may be mentioned as other economic members of the order. *Polygoneæ* comprises thirty genera and about 600 species. Examples are: *Coccoloba*, *Fagopyrum*, *Muehlenbeckia*, *Polygonum*, and *Rheum*.

FIG. 226. UPPER PORTION OF STEM OF POLYGONUM CUSPIDATUM

SPIRANTHES COLORATA, VAR. MACULATA.
(SYN. STENORHYNCHUS SPECIOSUM.)

POLYGONUM (from *polys*, many, and *gonu*, a knee-joint; referring to the numerous joints of the stem). Knot Grass or Weed. ORD. *Polygoneæ*. A very large genus (nearly 150 species) of handsome, annual or perennial, greenhouse or hardy herbs or (rarely) under-shrubs, of variable habit, found throughout the world, but rare within the tropics. Flowers usually fasciculate, sometimes so lax that they may be regarded as axillary; perianth funnel-shaped or campanulate, usually coloured, with five somewhat unequal segments; pedicels articulated above or below the middle. Leaves alternate, with ochreate stipules. A great number of the species, twelve

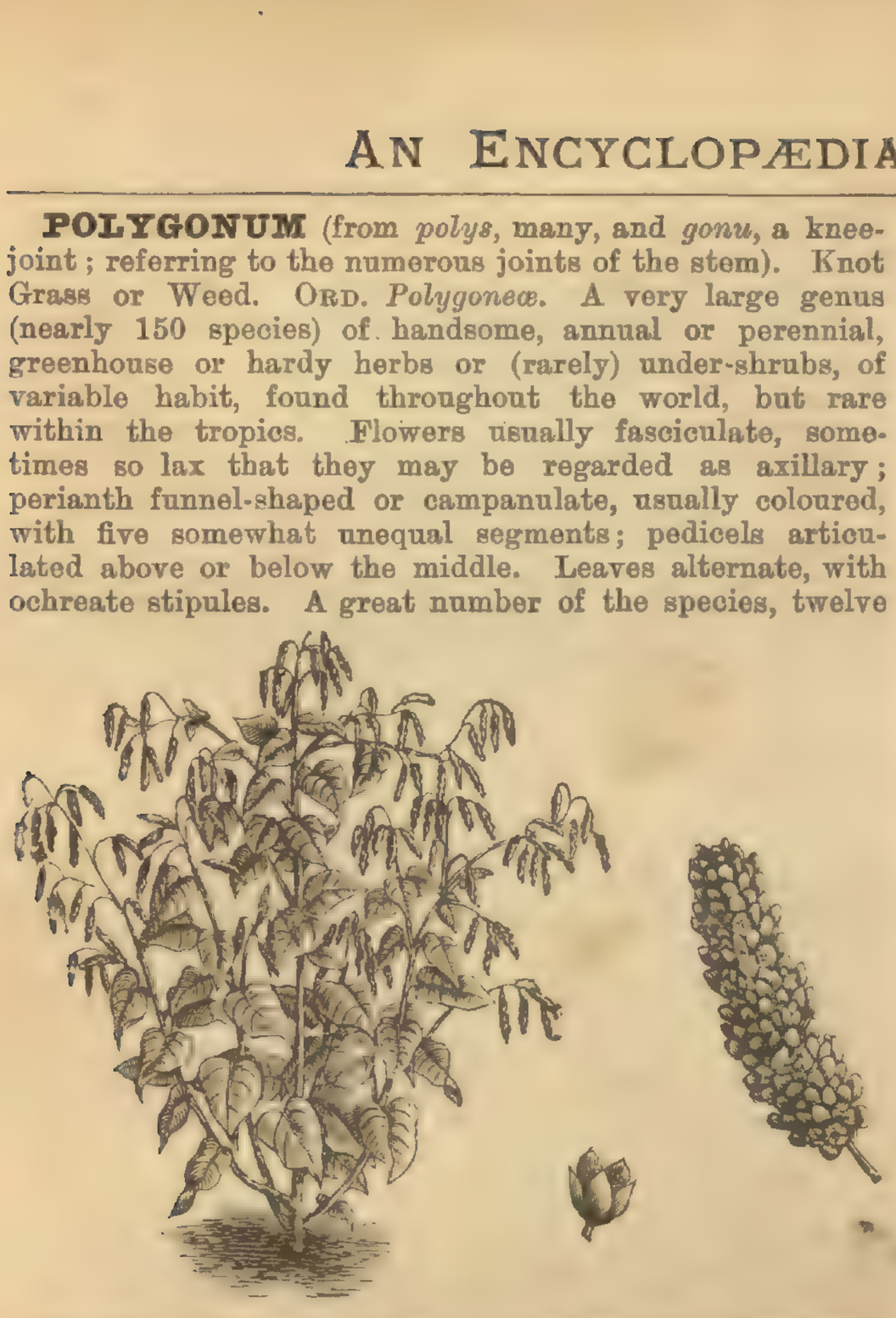

FIG. 227. POLYGONUM ORIENTALE, showing Habit, detached Spike, and Single Flower.

of which are British, are of no ornamental value whatever, but the following are desirable and worth growing. They are of the easiest possible culture in any ordinary garden soil, but they well repay generous treatment and a good position. *P. cuspidatum* and *P. sachalinense* are specially noteworthy and fine amongst hardy plants where space is allowed them to develop. The annuals are raised from seeds, sown in the open border, in spring, or raised in heat, and afterwards planted out. This latter plan is the best with such species as *P. orientale*, which, in a warm, sunny spot, in good, rich soil, forms a very fine plant. The perennials are increased by dividing the root-stocks.

P. affine (kindred).* *fl.* rosy-red, in dense spikes, freely produced throughout the autumn. *l.* few and narrow. *h.* 6in. to 8in. Nepaul, 1822. A very ornamental, hardy perennial. (B. M. 6472.) SYN. *P. Brunonis* (L. J. F. 117; L. & P. F. G. 37).

P. alpinum (alpine). *fl.* snow-white, panicled. Summer. *l.* ovate-lanceolate, deep green, with ciliated margins. *h.* 3ft. to 4ft. Alps, 1816. This very desirable perennial is particularly useful where cut flowers are much in request.

P. amphibium (amphibious). Willow Grass. *fl.* bright red, in dense, ovate spikes. July. *l.* lanceolate. Stem round, leafy. North temperate and Arctic regions (Britain). An aquatic or semi-aquatic perennial herb. When growing in water, the petioles are very long and the stipules smooth; whilst the terrestrial form has short petioles and hispid stipules. (Sy. En. B. 1242.)

Polygonum—*continued*.

P. amplexicaule (stem-clasping).* *fl.* bright rose-red or white, in solitary or twin racemes 2in. to 6in. long. September and October. *l.* cordate-ovate or cordate-lanceolate, long-acuminate, the lower long-petioled, the upper sessile and amplexicaul. Stems 2ft. to 3ft. high, from a strong, woody root-stock. Himalayas. Hardy perennial herb. (B. M. 6500.)

P. Bistorta. Bistort or Snakeweed. *fl.* reddish-pink, in a dense, terminal, erect, solitary spike. June to September. *l.* chiefly radical, large, oblong or ovato-obtuse, glaucous beneath, on long petioles. *h.* 1½ft. Europe (Britain), North and West Asia. Perennial herb. (Sy. En. B. 1243.)

P. Brunonis (Brown's). A synonym of *P. affine*.

P. capitatum (headed). *fl.* pink, small, growing in dense, round heads, on long stalks, from the upper leaf axils. *l.* ovate or elliptical, 2in. long, green, marked with dark V-shaped bands, extending from the midrib at the centre to the base of the leaf. Stems slender, diffuse, hairy, rooting. North India. A pretty little, cool greenhouse or half-hardy, perennial herb, with a neat, spreading habit. (Ref. B. 11.)

P. chinense foliis-pictis (painted-leaved Chinese). *l.*, some green, others purple, and all with a V-shaped mark, margined on the inside with a dark line of deep purple or blackish-green. China to India, &c. Hardy perennial herb. (B. M. 5238.)

P. compactum (compact).* *fl.* white, in erect racemes. September. *l.* somewhat crimped. *h.* 2ft. Japan, before 1875. This is probably a variety of *P. cuspidatum*; but it is very distinct in the way implied by its name, being more compact and rigid, and not more than half so tall. The leaves, too, are of a much darker colour. Its habit is, however, less graceful than that of *P. cuspidatum*. Hardy perennial herb. (B. M. 6476.)

P. cuspidatum (pointed-leaved).* *fl.* creamy-white, forming drooping, feathery panicles, 4in. to 5in. long, succeeded by scarlet fruits. Summer. *l.* large, somewhat distichous, oval-oblong, cuspidate, petiolate. *h.* 4ft. to 8ft. Japan, 1825. A hardy perennial herb, of quick growth, and having long, slender stems. It is best grown as an isolated specimen. See Fig. 226. (B. M. 6503; L. & P. F. G. i., p. 137; R. G. 291.) SYN. *P. Sieboldii* (of gardens).

P. filiforme variegatum (thread-like, variegated).* *l.* large, drooping, oval-oblong, finely splashed or marbled with pale green and yellow. Japan, 1865. A hardy perennial, fine for sub-tropical gardening.

P. orientale (Eastern).* *fl.* deep rosy-purple or white, in long, drooping racemes, which are both terminal and axillary. August. *l.* large, ovate-acuminate, pilose or nearly glabrous. *h.* 3ft. to 4ft., or sometimes nearly 10ft. East Indies, 1707. A large and free-growing, hardy annual, with very robust stems, which give off numerous, lateral shoots. See Fig. 227. (B. M. 213.)

P. sachalinense (Sachalin).* *fl.* of a delicate greenish-yellow colour, in axillary racemes; bracts ovate, long-pointed. Late summer. *l.* broadly ovate or ovate-oblong, acuminate, the lower

FIG. 228. POLYGONUM SACHALINENSE.

Polygonum—*continued.*

ones sub-cordate at the base, upper ones truncate, all with glaucous and prominently-veined under-surfaces. Stem erect, strong. *h.* 10ft. to 12ft. Sachalin Islands, 1869. A strong-growing, hardy perennial, differing chiefly from *P. cuspidatum* in its angular, striated stems. This plant luxuriates in a moist subsoil near the margin of water, and is a desirable subject for naturalising in semi-wild places. See Fig. 228. (B. M. 6540.)

P. Sieboldii (Siebold's). A garden synonym of *P. cuspidatum*.

P. sphærostachyum (round-spiked).* *fl.* blood-red, pendulous, in a broad, cylindric, globose spike. Autumn. *l.* 3in. to 5in. long, linear, linear-oblong, or lanceolate, acute, crispidate crenulate, glabrous and glaucous or pubescent beneath; radical ones stalked, cauline ones sessile. Alpine and sub-alpine Himalaya. Hardy. (B. M. 6847.)

P. tomentosum (tomentose). *fl.* clear rosy-pink, in erect, spike-formed panicles at the tips of the branches. *l.* large, oblong-lanceolate, very much attenuated at the apex, covered on both surfaces, but especially beneath, with greyish hairs. India, 1876. A half-hardy or greenhouse perennial. (R. G. 810.)

P. vaccinifolium (Whortleberry-leaved).* *fl.* bright rose, freely produced in long, nearly round spikes. Late summer and autumn. *l.* smooth, ovate or elliptic, attenuated at both ends, the margin slightly revolute, bright green, sometimes tinged with red above, pale beneath. Stems much-branching, woody, prostrate. Himalaya, 1845. A hardy perennial, one of the most useful plants for rockwork in cultivation. (B. M. 4622.)

POLYMNIA (dedicated to the muse Polyhymnia, for no obvious reason, the species being coarse and inelegant). Leaf-cup. ORD. *Compositæ*. A genus comprising about a dozen species of greenhouse or hardy, glabrous, scabrous-pubescent or villous, often slightly viscid, perennial herbs, shrubs, or trees, natives of America, from Bonaria to Canada. Flower-heads yellow or yellowish, heterogamous, rather large, mediocre, or small, corymbosely paniculate; achenes glabrous; involucre hemispherical or expanded, with two-seriate

FIG. 229. TUBERS OF POLYMNIA EDULIS.

bracts; receptacle flat. Leaves opposite, or the upper ones alternate, often ample, entire, angulate, or lobed. The species best known to cultivation are described below. They are very useful for sub-tropical gardening in the South of England. A warm position and deep, rich soil are essential elements in their culture. Propagated freely, in spring, by divisions; by cuttings, struck in sand, in a gentle heat, during January; or by seeds, sown in heat, at the same time.

Polymnia—*continued.*

P. canadensis (Canadian). *fl.-heads* whitish-yellow, small; rays few, obovate or wedge-shaped, shorter than the involucre. July. *l.*, lower ones deeply pinnatifid, the uppermost ones triangular-ovate, and three to five-lobed or angled, petioled. *h.* 6ft. North America, 1768. Hardy herbaceous perennial.

P. edulis (edible). *fl.-heads* yellow. A tall, coarse-growing, hardy perennial, cultivated in the Andean region for the sake of its edible tubers. See Fig. 229.

P. grandis (large). A synonym of *Montanoa bipinnatifida*.

P. heracleifolia (Heracleum-leaved). A synonym of *Montanoa bipinnatifida*.

P. pyramidalis (pyramidal). *fl.-heads* having a yellow ray and a dark brown disk, disposed in cymes. Summer and autumn. *l.* cordate-ovate, 12in. long by 16in. broad, with decurrent petioles. *h.* 10ft. A free and rapid-growing, half-hardy, arborescent perennial, something like the Sunflower in habit. New Grenada, 1867. (R. H. 1867, 210.)

P. Uvedalia (Uvedalia). *fl.-heads* yellow; rays ten to fifteen, linear-oblong, much longer than the inner scales of the involucre; outer involucral scales very large. September. *l.* broadly ovate, angled and toothed, nearly sessile; lower ones palmately lobed abruptly narrowed into a winged petiole. *h.* 4ft. to 10ft. United States, 1699. Hardy herbaceous perennial.

POLYPARA. A synonym of **Houttuynia** (which *see*).

POLYPETALOUS. Having petals perfectly distinct.

POLYPHEMA. A synonym of *Artocarpus*.

POLYPODIUM (the old Greek name, used by Theophrastus, from *polys*, many, and *podion*, a little foot; on account of the appearance of the rhizome and its appendages). Polypody. Including *Aglaomorpha*, *Calymmodon*, *Campyloneuron*, *Colysis*, *Craspedaria*, *Cryptosorus*, *Cyrtomiphlebium*, *Dibblemma*, *Dictymia*, *Dictyopteris*, *Drynaria*, *Dryostachyum*, *Goniophlebium*, *Goniopteris*, *Grammitis* (in part), *Lecanopteris*, *Lepicystis*, *Lopholepis*, *Microgramme*, *Microsorium* (in part), *Monachosorum*, *Niphobolus*, *Niphopsis*, *Paragramma*, *Phegopteris*, *Phlebodium*, *Phymatodes*, *Pleopeltis*, *Pleuridium*, *Polycampium*, *Pseudathyrium*, and some other less important so-called genera. ORD. *Filices*. The largest genus of the order, comprising upwards of 450 species. It includes plants of two different modes of growth, each series comprising a number of species of each of the different kinds of venation, and from all climates. Sori on the back of the lobes, round or rarely oblong, not more than twice as long as broad. Polypodiums are very handsome plants; they thrive under very varied conditions. Many of them, perhaps, do best in good fibrous loam and soil rich in humus; others thrive on blocks of fibry peat, on tree-fern stems, or treated as basket-plants. Some of them are eminently adapted for crevices on rockwork. Except where otherwise stated, the species described below thrive under stove treatment. For general culture, &c., *see* **Ferns.**

P. acrostichoides (Acrostichum-like). *rhiz.* woody, wide-creeping, scaly, black in the centre. *sti.* 1in. to 3in. long, firm, erect. *fronds* 1ft. to 2ft. long, ½in. to 1in. broad, ligulate, gradually narrowed below, naked above, dirty-white-tomentose beneath. *sori* bright-coloured, not immersed, small, close, covering the whole upper part of the frond. Ceylon, Queensland, &c. Greenhouse. SYN. *Niphobolus acrostichoides*.

P. adnascens (adnascent). *rhiz.* slender, firm, with linear, deciduous scales. *sti.* ¼in. to 1in. long, firm, erect. *fronds* dimorphous; the barren ones elliptical or spathulate, blunt; the fertile ones longer and narrower, 6in. to 12in. long, ¼in. to ½in. broad, naked above, white-tomentose beneath. *sori* bright-coloured, small, immersed, occupying the whole of the contracted upper part of the frond. India, &c., 1824. SYN. *Niphobolus adnascens* (H. G. F. 19).

P. adnatum (adhering). *sti.* 6in. to 12in. long, naked, glossy. *fronds* 1½ft. to 3ft. long, 1ft. broad, with an oblong-lanceolate, entire fertile pinna, 6in. to 9in. long, and 1½in. to 2in. broad, and several similar lateral ones on each side, the upper ones broadly adnate to the rachis at the base. *sori* and *areolæ* in rows of four to six between the midrib and edge. Guatemala, &c. SYN. *Goniophlebium adnatum*.

P. albo-punctatissimum (much dotted with white). A variety of *P. crassifolium*.

P. albo-squamatum (white-scaly).* *rhiz.* woody, with dark brown scales, sometimes 1in. long. *sti.* 6in. to 12in. long, firm, erect, glossy. *fronds* sometimes simple, usually pinnate, 1ft. to

Polypodium—*continued.*

2ft. long, 1ft. or more broad, with several distant, erecto-patent pinnæ on each side, which are 6in. to 10in. long, and ½in. to ¾in. broad, the apex acuminate, the edge slightly repand towards the point, the base narrowed, the lower ones stalked; upper surface with small, white dots at the edge or all over. *sori* in a single row midway between the edge and midrib. Malay Isles and Philippines. (H. G. F. 47.) SYN. *Phymatodes albo-squamata.*

P. alpestre (alpine). *sti.* 4in. to 6in. long, tufted, scaly below. *fronds* 1ft. to 2ft. long, 6in. to 8in. broad, oblong-lanceolate; pinnæ lanceolate, 3in. to 4in. long, 1in. to 1½in. broad; pinnules deeply pinnatifid, with toothed lobes. *sori* small, one to four to each lobe. Cold regions of Northern hemisphere (Britain, &c.). This species closely resembles *Asplenium Filix-fœmina.* SYN. *Pseudathyrium alpestre.*

P. a. flexile (pliable). A variety of more flaccid habit; the pinnules oblong, with fewer lobes, and a broad, uncut centre. SYN. *Pseudathyrium flexile.*

P. amphostemon. A form of *P. angustifolium.*

P. androgynum (hermaphrodite). *sti.* 1ft. to 2ft. long, erect, naked or slightly villous. *fronds* 1ft. to 3ft. long, 1ft. or more broad; pinnæ 6in. to 8in. long, ½in. to 1in. broad, numerous, spreading, lowest narrowed at base and sometimes stalked, cut a quarter to half way down into blunt lobes; rachis and under side sometimes slightly hairy. *sori* in rows near the midrib. Cuba to Peru, 1843. SYNS. *P. tetragonum, Goniopteris tetragona.* In the form *megalodus*, the pinnæ are 1½in. and the lobes ¼in. broad, the latter sub-falcate.

FIG. 230. POLYPODIUM ANGUSTATUM.

P. angustatum (narrowed). *rhiz.* stout, wide-creeping, clothed with whitish, linear, deciduous scales. *sti.* 2in. to 4in. long, strong, erect. *fronds* 6in. to 12in. long, ½in. to 1½in. broad, ligulate, entire, very coriaceous; upper surface naked, the lower clothed with adpressed, cottony, sub-ferruginous tomentum. *sori* large, prominent, in rows near the edge of the contracted upper part, and sometimes confluent. North India, New South Wales, &c. Greenhouse. See Fig. 230. (H. G. F. 20.)

P. angustatum (narrow), of Blume. A synonym of *P. palmatum.*

P. angustifolium (narrow-fronded). *rhiz.* stout, epigæous, brown-scaly. *fronds* 1ft. to 1½ft. long, only ¼in. broad, quite entire, with an acute point; the lower part gradually narrowed into a generally short stem; edges often revolute. *sori* and *areolæ* in from one to four rows between the midrib and edge; the former in two rows between the main veins. Cuba, Brazil, &c., 1820. SYN. *Campyloneurum angustifolium.* A very variable species. The broadest form, *amphostemon*, has fronds 1in. broad, with four rows of sori; the variety *ensifolium* has narrow, sessile fronds, with the areolæ and sori in one row between the edge and midrib.

P. argutum (pungent). *rhiz.* ¼in. thick, firm, wide-creeping, with minute, dark brown scales. *sti.* 3in. to 6in. long, naked, castaneo-straminеous. *fronds* oblong-lanceolate, sub-erect, 1ft. to 2ft. long, 8in. to 12in. broad, simply pinnate; pinnæ ten to twenty-jugate, ligulate, acuminate, faintly inciso-crenate, ¼in. to ¾in. broad, many free and distant, the lowest not reduced. *sori* and *areolæ* uniserial, the former not close, nearer the midrib than the edge. Himalayas, 1843. Greenhouse.

P. asperulum (rather rough). *sti.* brownish, firm, terete, pubescent. *fronds* 1½ft. to 2ft. long, 1ft. or more broad lower

Polypodium—*continued.*

pinnæ 6in. to 9in. long, ¼in. broad, unequal-sided, cut down to the rachis below into oblong, pinnatifid segments; both surfaces villous. *sori* copious, one to each ultimate lobe. Philippines, 1842. SYN. *Phegopteris asperula.*

P. asplenioides (Asplenium-like). A variety of *P. reptans.*

P. attenuatum (thin), of Robert Brown. A synonym of *P. Brownii.*

P. aureum (golden).* *rhiz.* stout, wide-creeping, clothed with bright, ferruginous scales. *sti.* 1ft. to 2ft. long, stout, erect, glossy. *fronds* 3ft. to 5ft. long, 9in. to 18in. broad, with a long, linear-lanceolate, terminal lobe, and cut throughout within about ½in. of the rachis into numerous, undulated, lateral pinnæ, 4in. to 9in. long, about 1in. broad, with a rounded sinus between. *sori* irregularly one to three-seriate. *areolæ* copious. Tropical America and Australia, 1742. SYN. *Phlebodium aureum.*

P. a. areolatum (areolate). A variety with smaller, more coriaceous, and very glaucous fronds, closer lobes, and uniserial sori. SYNS. *P. sporadocarpum, Phlebodium areolatum.*

P. a. pulvinatum (cushion-like). This resembles *P. a. areolatum*, but the fronds are hardly at all glaucous, and the terminal lobe is very small. SYN. *Phlebodium pulvinatum.*

P. auriculatum (eared). *sti.* tufted, 1½ft. to 2ft. long, deciduously villous. *fronds* 3ft. to 4ft. long, 1ft. or more broad; pinnæ 6in. to 8in. long, 1in. broad, cut down nearly to the rachis into close, spreading, entire, blunt lobes; lower pinnæ reduced to mere auricles, furnished with a prominent gland at the base beneath. *sori* borne about the middle of the veinlets. Himalayas, 1824.

P. bifrons (two-fronded). *rhiz.* woody, slender, branched, tortuous, nearly naked. *fronds*, barren ones 3in. to 4in. long, 1in. broad, sessile, elliptical, narrowed at both ends, with blunt lobes, reaching nearly half way down; fertile ones 4in. to 6in. long, about ¼in. broad, entire, short-stalked. *sori* large, oblong, placed end to end in a row on each side, close to the midrib. Ecuador. SYN. *Phymatodes bifrons.*

P. Billardieri (La Billardière's). *rhiz.* woody, wide-creeping, with scales black in the centre. *sti.* 4in. to 8in. long, firm, erect, glossy. *fronds* varying from oblong-lanceolate and quite entire to 18in. long and 9in. broad, deeply pinnatifid, with lanceolate or linear lobes. *sori* large, uniseriate, medial or sub-marginal, distinctly immersed. South Australia, &c., 1823. Greenhouse. SYN. *Phymatodes Billardieri.*

P. biserratum (twice-serrated). A form of *P. subpetiolatum.*

FIG. 231. PINNA OF POLYPODIUM BRASILIENSE.

P. brasiliense (Brazilian). *rhiz.* stout, with grey scales. *sti.* 6in. to 12in. long, firm, erect, glossy. *fronds* 1ft. to 2ft. long, frequently 1ft. broad, cut to the rachis into numerous entire, erecto-patent pinnæ, which are 4in. to 6in. long, ¾in. to ¾in. broad, dilated at base. *sori* slightly immersed, in one or two rows. *areolæ* in three or four rows. Brazil, &c., 1837. See Fig. 231. SYN. *P. neriifolium.*

P. Brownii (Brown's). *rhiz.* woody, wide-creeping, with dull brown scales. *fronds* scattered, 6in. to 18in. long, ¼in. to ¾in. broad, ligulate, with a blunt point, entire or slightly repand edges, and the lower part gradually narrowed to a base or short stem. *sori* large, immersed, arranged in a single row, end to

Polypodium—*continued.*

end, with a space between each, midway between the midrib and edge. . *areolæ* uniform. Australia, &c., 1823. Greenhouse. SYNS. *P. attenuatum* (H. G. F. 30), *Phymatodes Brownii.*

P. californicum (Californian). *rhiz.* wide-creeping, with spreading, ferruginous scales. *sti.* 3in. to 6in. long, firm, erect, naked. *fronds* 6in. to 9in. long, 3in. to 5in. broad, oblong-deltoid, cut down nearly or quite to the rachis into entire or finely-toothed pinnæ, 1½in. to 2½in. long, ⅜in. to ½in. broad, the lowest not reduced. *sori* large, in single rows near the midrib. California. Greenhouse. SYN. *Goniophlebium californicum.*

P. Cameroonianum (Cameroons). *sti.* 4ft. long, glossy. *fronds* 3ft. to 4ft. long, 2ft. broad, the upper part pinnatifid, with deep, lanceolate lobes; lower pinnæ deltoid, upwards of 1ft. long, 6in. to 8in. broad, cut down below nearly to the rachis into lanceolate, pinnatifid lobes. *sori* in rows near the main veins. *areolæ* copious. Cameroon Mountains. SYN. *Dictyopteris Cameroonianis.*

P. capitellatum (small-headed). A synonym of *P. juglandifolium.*

P. Catharinæ (St. Catherine's). *rhiz.* wide-creeping, with dark brown scales. *sti.* 4in. to 6in. long, erect, glossy. *fronds* 6in. to 12in. long, 3in. to 5in. broad, cut down to the rachis into close, blunt, sub-entire, spreading pinnæ, 1¼in. to 3in. long, ¼in. to ½in. broad, the lowest pair shorter and deflexed. *sori* large, in two rows close to the midrib. Brazil, 1824.

P. ciliatum (ciliated). A variety of *P. piloselloides.*

P. colpodes (embosomed). A synonym of *P. plesiosorum.*

P. conjugatum (mixed). *rhiz.* very thick, densely matted, with light brown scales. *fronds* 2ft. to 4ft. long, 1ft. to 1½ft. broad, arranged in a circle, the stem with a lobed wing, 2in. to 4in. broad, on each side at the base, which is narrowed and more deeply lobed upwards, passing gradually into the frond, which is cut down nearly to the rachis throughout into entire, erecto-patent pinnæ, 4in. to 8in. long, 1in. to 1½in. broad. *sori* in a single row close to the anterior main vein, sometimes confluent. India, &c. SYNS. *P. coronans, Drynaria conjugata.*

P. coronans (crowned). A synonym of *P. conjugatum.*

P. corymbiferum (corymbose). A form of *P. Lingua.*

P. crassifolium (thick-fronded).* *rhiz.* woody, short-creeping, with dull brown scales. *sti.* 2in. to 6in. long, strong, erect. *fronds* 1ft. to 3ft. long, 1in. to 5in. wide, gradually narrowed to both ends, the edge entire, upper side with scattered small, white, dots; texture very coriaceous. *sori* in single rows between the main veins, two to nine in a row between the edge and midrib. West Indies, &c., 1823. SYN. *Pleuridium crassifolium.* The variety *albo-punctatissimum* is a much-dotted form, with less distinctly raised veins than usual. SYN. *Pleuridium albo-punctatissimum.*

P. crassinervium (thickly-nerved). A synonym of *P. platyphyllum.*

P. crenatum (scolloped). *sti.* 1ft. to 2ft. long, erect, naked or pubescent. *fronds* 1ft. to 2ft. long, 1ft. or more broad, with an oblong-lanceolate, terminal pinna, 6in. to 8in. long and 1½in. to 2in. broad, the edge a little bluntly lobed or nearly entire, and two or four opposite pairs of similar ones. *sori* in rows near the main veins. Cuba, &c., 1823. SYN. *Goniopteris crenata.*

P. curvatum (curved). *rhiz.* stout, scaly. *sti.* 3in. to 4in. long, naked, glossy, dark brown. *fronds* 1ft. to 1½ft. long, 2in. to 3in. broad, pendent, cut down to the rachis into close, crenated, linear pinnæ, which are decurrent at base. *sori* bright yellow, in two long rows. Jamaica, &c., 1823.

P. cuspidatum (pointed). A synonym of *P. persicæfolium.*

P. cyatheæfolium (Cyathea-fronded). *sti.* 1ft. to 1½ft. long, firm, naked, stramineous. *fronds* 1½ft. to 2ft. long, 1ft. or more broad; pinnæ 6in. to 9in. long, 2in. or more broad, cut down to a broadly-winged rachis into falcate, entire lobes, ¼in. to ⅜in. broad, the lowest pair rather smaller and deflexed. *sori* about the centre of the veinlets. Mauritius and Bourbon. SYN. *P. Sieberianum.*

P. decumanum (tall). *rhiz.* stout, with soft, bright, ferruginous scales. *sti.* 1ft. to 2ft. long, stout, erect, glossy. *fronds* 1ft. to 3ft. long, 1ft. to 2ft. broad, cut down nearly, or below quite, to the rachis into ligulate, nearly entire pinnæ, often 1ft. long, 2in. to 3in. broad. *sori* each terminating two or three free veinlets. Tropical America, Brazil, 1818. SYNS. *P. dictyocallis, Phlebodium decumanum.*

P. decurrens (decurrent). *rhiz.* wiry, rather slender, with deciduous scales. *sti.* 6in. to 12in. long, firm, naked. *fronds* usually with several erecto-patent pinnæ on each side, which are 8in. to 12in. long, 1½in. to 2in. broad, with an acuminate point, a narrowed base, and nearly entire edges. *areolæ* about six, between the edge and midrib, with two or three sori in each. Brazil and Peru. SYN. *Campyloneurum decurrens.*

P. decussatum (decussate). *sti.* 2ft. to 3ft. long, stout, erect, polished upwards, scaly at base, sometimes slightly muricated. *fronds* 3ft. to 4ft. or more long, 1ft. to 1½ft. broad; pinnæ 8in. to 12in. long, 1in. to 1½in. broad, cut down nearly or quite to the rachis into close, spreading, entire, blunt lobes, with a large, subulate gland at the base beneath. *sori* in rows near the midrib. West Indies, &c. SYN. *Phegopteris decussata.*

P. deflexum (bent-down). *cau.* erect, with dull brown scales. *sti.* 2in. to 3in. long, slender, naked, stramineous. *fronds* 8in. to

Polypodium—*continued.*

12in. long, 2in. broad; pinnæ 1in. long, ¼in. broad, lanceolate, acuminate, cut down to the rachis into linear-oblong, pointed lobes; lower pinnæ deflexed, gradually dwindling to mere auricles; both sides slightly hairy. *sori* nearer the midrib than the edge. New Grenada, 1830. SYN. *Phegopteris deflexa.*

FIG. 232. PINNA OF POLYPODIUM DIVERSIFOLIUM.

P. Dianæ (Diana's). A synonym of *P. molle.*

P. dictyocallis (beautifully-netted). A synonym of *P. decumanum.*

P. difforme (deformed). *sti.* tufted, erect, 1ft. or more long, scaly below. *fronds* 3ft. to 4ft. long; upper pinnæ lanceolate, entire, or with broad, blunt or falcate lobes reaching half way or more down to the rachis; lower pinnæ often deltoid, with the lobes of the lower side prolonged and pinnatifid. *sori* scattered, very copious. *areolæ* also copious. Malay Peninsula and Isles. SYNS. *P. irregulare, Dictyopteris irregularis.*

FIG. 233. PORTION OF FROND OF POLYPODIUM DREPANUM.

P. dilatatum (dilated). *rhiz.* woody, thick, with large, dull brown scales. *sti.* 1ft. or more long, with a narrow wing reaching nearly to the base. *fronds* 1½ft. to 3ft. long, 1ft. or more broad, cut down within about ½in. of the rachis into entire, acuminate, erecto-patent lobes, 4in. to 8in. long, ½in. to 1½in. broad. *sori* small, copious, irregularly scattered. *areolæ* fine, copious, with free veinlets. North India, &c. SYN. *Colysis dilatata.*

Polypodium—*continued.*

P. diversifolium (variable-fronded). *sti.* 1ft. to 2ft. long, tufted, slender, naked. *fronds* 1ft. to 2ft. long, 6in. to 9in. broad; pinnæ 3in. to 5in. long, ¾in. to 1in. broad, the apex acuminate, the lower ones narrowed at base, the edge nearly entire. *sori* in contiguous rows. South Brazil, &c. See Fig. 232. SYN. *P. fraxinifolium.*

P. diversifolium (variable-fronded), of R. Brown. A synonym of *P. rigidulum.*

P. drepanum (sickle).* *sti.* tufted, 1ft. to 1½ft. long, with dark scales below. *fronds* 1½ft. to 3ft. long, 8in. to 12in. broad; lowest pinnæ the largest, 6in. to 8in. long, 1½in. to 2in. broad; pinnules lanceolate, unequal-sided, auricled on the upper, truncate on the lower, side at the base, with a broad, uncut centre and copious, spinous teeth, the lowest stalked. *sori* medial. Madeira. Greenhouse. See Fig. 233. SYN. *Phegopteris drepana.*

FIG. 234. POLYPODIUM DRYOPTERIS.

P. Dryopteris (Dryopteris).* Oak Fern. *rhiz.* slender, wide-creeping. *sti.* 6in. to 12in. long, slender, stramineous, scaly below, naked upwards. *fronds* 6in. to 10in. each way, deltoid; lower pinnæ much the largest; pinnules lanceolate, only the lowest free, oblong, slightly crenate. *sori* sub-marginal. Northern hemisphere (Britain). See Fig. 234.

P. D. Robertianum (Herb-Robert scented). A variety with a thicker rhizome, the whole plant being more rigid than in the type, and finely glandular. (H. B. F. 5.)

P. elasticum (elastic). *rhiz.* stout, woody, short-creeping or sub-erect, with brown scales. *fronds* 9in. to 18in. long, 2in. to 4in. broad, lanceolate, cut down to the rachis into patent, adnate, ligulate, entire, blunt forty to one hundred-jugate pinnæ, the lower ones gradually reduced. *sori* minute, superficial, medial. Mexico, &c., 1824. SYNS. *P. Plumula, P. Schkuhri.*

P. ensifolium (sword-fronded). A form of *P. angustifolium.*

P. Filipes (thread-footed). A young state of *P. tenellum.*

P. fraternum (fraternal).* *rhiz.* wide-creeping, with bright ferruginous scales. *sti.* 4in. to 8in. long, firm, erect, naked. *fronds* 1ft. to 1½ft. long, 6in. to 9in. broad; lower pinnæ 1in. apart, 4in. to 5in. long, narrowed at both ends, and with obscurely crenated edges. *sori* slightly immersed, medial, uniseriate. Mexico. SYN. *P. Henchmanni.*

P. fraxinifolium (Ash-leaved). *rhiz.* stout, with dark brown scales. *sti.* 1ft. to 2ft. long, firm, erect, naked. *fronds* 2ft. to 4ft. long, 1ft. to 1½ft. broad; pinnæ numerous on each side, distinct, 4in. to 9in. long, 1in. to 2in. broad, the apex acuminate, the base narrowed, and the edge entire. *sori* and *areolæ* in series of six to eight. Columbia, &c. See Fig. 235. SYN. *Goniophlebium fraxinifolium.*

P. fraxinifolium (Ash-leaved), of Jacquin. A synonym of *P. diversifolium.*

P. Gardneri (Gardner's). *rhiz.* short-creeping; scales black, bordered with brown. *sti.* 3in. to 4in. long, firm, naked. *fronds* 1ft. to 1½ft. long, 1in. to 1½in. broad, narrowed gradually towards both ends, with entire edges; lower surface densely grey-tomentose. *sori* in close rows of about four each between the main veins. Ceylon. (H. E. F. 68.) SYN. *Niphobolus Gardneri.*

P. geminatum (paired). *rhiz.* very wide-creeping, stout, with ferruginous scales. *fronds* sub-sessile, usually in distant pairs, entire, uniform, 3in. to 6in. long, ½in. to 1in. broad, narrowed towards both ends, but the point often blunt. *sori* in a row midway between the edge and midrib, distinctly immersed. Brazil. SYN. *Anapeltis geminata.*

P. Ghiesbreghtii (Ghiesbreght's). *sti.* 1ft. or more long, firm, erect, densely villous. *fronds* 1ft. to 1½ft. long, with a terminal pinna 6in. to 9in. long, 1½in. to 2in. broad, the edge slightly lobed, and three to six similar ones on each side; rachises and under surface densely villous, upper surface slightly so. *sori* in dense rows close to the main vein. South Mexico. SYN. *Goniopteris crenata.*

P. glaucophyllum (glaucous-fronded). *rhiz.* wide-creeping, firm, deciduously scaly. *sti.* 2in. to 6in. long, scattered, firm, erect, glossy. *fronds* 4in. to 10in. long, 1in. to 2in. broad, uniform, oblong-lanceolate, entire, with a rounded base and an acuminate point. *areolæ* four to six in a series between the edge and midrib, with one sorus in each. Tropical America, &c., 1874. SYN. *Goniophlebium glaucophyllum.*

P. gonatodes (angled). A synonym of *P. plesiosorum.*

P. grandidens (large-toothed). A variety of *P. persicæfolium.*

P. grandifolium (large-fronded). A variety of *P. membranaceum.*

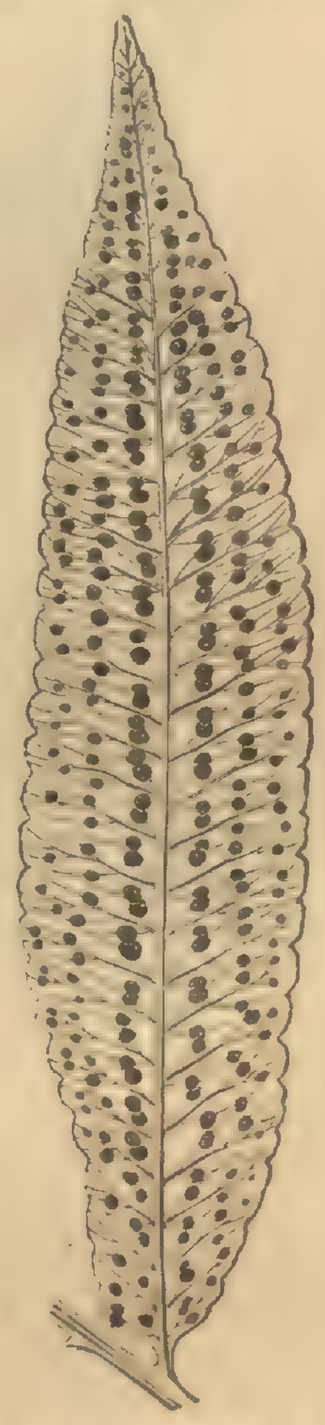

FIG. 235. PINNA OF POLYPODIUM FRAXINIFOLIUM.

P. guatemalense (Guatemalan). *sti.* 6in. to 12in. long, naked, stramineous. *fronds* 2ft. to 3ft. long, 1ft. or more broad, with an entire, terminal pinna 6in. to 8in. long, 1in. to 1½in. broad, and several similar ones on each side, the upper ones narrowed, but adnate at the base. *areolæ* in series of three or four, with the large, uniseriate sori in the first or second row. Guatemala. SYN. *Phlebodium inæquale.*

P. harpeodes (scimitar-like). A synonym of *P. loriceum latipes.*

P. hastæfolium (spear-fronded). *sti.* tufted, 1in. to 2in. long, wiry, deciduously scaly. *fronds* 6in. to 9in. long, 1½in. to 2in. broad; pinnæ blunt, entire, ¾in. broad, with a sharp, distinct auricle on both sides at the base, those of the lower half of the frond gradually reduced. *sori* below the middle of the veinlets. West Indies. SYN. *Phegopteris hastæfolia.*

P. hemionitideum (Hemionitis-like). *rhiz.* hypogæous, woody. *sti.* 1in. to 6in. long, firm, woody. *fronds* 9in. to 18in. long, 2in. to 3in. broad, narrowed to both ends, with entire edges. *sori* in an irregular row between each main vein, often confluent. India and China. SYN. *Colysis membranacea.*

P. Henchmanni (Henchmann's). A synonym of *P. fraternum.*

P. Heracleum (Cow-Parsnip-like).* *rhiz.* stout, with light brown, silky scales. *fronds* 3ft. to 6ft. long, 2ft. or more broad, with a cordate lobed wing, ¾in. broad, at the base; upper part

Polypodium—*continued.*

cut down to a broadly-winged rachis into entire, acute lobes, which are often 1ft. to 1½ft. long and 3in. to 4in. broad. *sori* small, copious, slightly immersed, scattered. Java and Philippines. See Fig. 236. (H. G. F. i.) SYNS. *P. morbillosum*, *Drynaria Heraclea.*

FIG. 236. POLYPODIUM HERACLEUM.

P. hexagonopterum (six-angled-winged). *rhiz.* wide-creeping. *sti.* 1ft. to 1½ft. long, slender, glossy, stramineous. *fronds* 8in. to 12in. long, and nearly as broad, deltoid; lower pinnæ 4in. to 6in. long, the lowest pair deflexed, often 2in. broad; pinnules reaching down nearly to the rachis, those of the lower side 1in. to 1½in. long, pinnatifid half way down with broad, blunt lobes; under side slightly villous. *sori* marginal. North America, 1811. Hardy. SYN. *Phegopteris hexagonoptera.*

P. himalayense (Himalayan). *rhiz.* wide-creeping, woody, with long, yellowish-brown scales. *sti.* 6in. to 9in. long, firm, erect, naked. *fronds* 1ft. to 2ft. long, 8in. to 10in. broad; pinnæ in distant pairs, 4in. to 8in. long, 1½in. to 2in. broad, with an acuminate point, scarious, wavy edges, and the base rounded or cordate; under surface pubescent. *sori* in one or two rows, of three or four each, between the main veins. *areolæ* close, fine. North India. SYNS. *P. venustum*, *Phymatodes himalayensis.*

P. incanum (hoary). *rhiz.* wide-creeping, woody, with dense, dull brown scales. *sti.* 1in. to 4in. long, erect, firm, furfuraceous. *fronds* 2in. to 4in. long, 1in. to 1½in. broad, cut down to the rachis into entire, spreading, somewhat distant pinnæ, ¼in. broad, dilated at base; under side densely scaly. *sori* uniseriate. Temperate America and South Africa, &c., 1840. Greenhouse. SYN. *Lepicystis incana.*

P. incurvatum (incurved). *rhiz.* woody, with adpressed scales. *fronds* dimorphous; barren ones 6in. to 9in. each way, deltoid, ternate, or pinnatifid, with broad, lanceolate, acuminate, entire lobes, and a firm, glossy stem, 6in. to 9in. long; fertile ones larger, cut almost, or below quite, to the rachis into distant, erecto-patent, entire lobes, 4in. to 8in. long, about ¼in. broad, the lowest occasionally forked. *sori* uniseriate, quite immersed, and forming prominent papillæ on the upper surface. Malaccas. SYN. *Phymatodes incurvata.*

P. irregulare (irregular). A synonym of *P. difforme.*

P. juglandifolium (Walnut-leaved).* *rhiz.* woody, stout, with bright ferruginous scales. *sti.* 1ft. or more long, erect. *fronds* 1½ft. to 2ft. long, 1ft. or more broad; pinnæ 4in. to 8in. long, 1in. to 1½in. broad, in pairs about 2in. apart, with an acuminate tip, thickened and wavy edges, and a rounded base. *sori* large, one between each main vein, forming a row nearer the midrib than the edge. *areolæ* copious, hidden. North India. SYNS. *P. capitellatum*, *Pleuridium juglandifolium.*

P. lachnopodium (downy-footed). *sti.* densely hairy at the base (as is also the rachis). *fronds* 2ft. to 5ft. long, bi-tripinnatifid; pinnules 9in. to 12in. long, lanceolate. Jamaica, 1843. A rare species in cultivation.

P. lanceolatum (lance-shaped). *rhiz.* wide-creeping, wiry, with bright ferruginous scales. *sti.* 1in. to 3in. long, distant, erect. *fronds* 3in. to 9in. long, about ½in. broad, gradually narrowed at both ends; both sides coated with peltate scales. *sori* large, immersed, uniseriate, sometimes reaching from the edge to the midrib. West Indies, &c., 1812. (H. E. F. 62, under name of *Pleopeltis ensifolia.*)

P. leiorhizon (smooth-rhizomed). *rhiz.* very thick, with adpressed scales. *sti.* 1ft. to 2ft. long, erect, firm. *fronds* 2ft. to 4ft. long, 1ft. to 2ft. broad; pinnæ narrowed at base, the lower ones stalked, 6in. to 12in. long, ¾in. to 1¼in. broad, with an acuminate apex and entire edge. *sori* slightly immersed, in a row near the midrib on each side. *areolæ* fine, uniform. North India. SYN. *Phymatodes leiorhiza.*

Polypodium—*continued.*

P. lepidopteris rufulum (scaly-winged, reddish). *rhiz.* stout, with bright reddish-brown scales. *sti.* 1in. to 4in. long, erect. *fronds* 6in. to 8in. long, 1½in. to 3in. broad, cut down to the rachis into horizontal, entire pinnæ, ⅜in. broad, blunt, much twisted, the lower gradually reduced. *sori* copious. Mexico, &c. SYN. *P. rufulum.*

P. l. sepultum (inclosed). *fronds* ovate-lanceolate; lower pinnæ scarcely reduced. Otherwise similar to *P. l. rufulum.* SYN. *P. sepultum.*

P. Lindleyanum (Lindley's). A form of *P. palmatum.*

P. lineare (linear). *rhiz.* woody, wide-creeping, with dull brown scales. *sti.* from almost none to 1in. to 2in. long. *fronds* 6in. to 12in. long, ½in. to 2in. broad, entire, narrowed gradually to both ends. *sori* distinctly immersed, large, prominent, forming a single row nearer the midrib than the edge, scaly when young. North India. (H. G. F. 14, under name of *Pleopeltis nuda.*) In the variety *simplex*, the fronds are sometimes 1½ft. long and 2in. broad.

P. Lingua (tongue-like).* *rhiz.* wide-creeping, with ferruginous scales. *sti.* 3in. to 6in. long, firm, erect. *fronds* uniform, 4in. to 8in. long, 1in. to 4in. broad, the apex often cuspidate, the edge entire, the base narrowed or rounded; lower surface matted with close, cottony, somewhat ferruginous down. *sori* in close rows of four to six each between the main veins, rather large and prominent. North India, Japan, &c. SYN. *Niphobolus Lingua.* The variety *corymbiferum* has fronds much divided at the apex, forming a cluster.

FIG. 237. POLYPODIUM LINGUA HETERACTIS.

P. L. Heteractis (Heteractis). This form differs from the type in having broader, oblong-lanceolate fronds. Himalayas. See Fig. 237. SYN. *Niphobolus latus.*

P. longifolium (long-fronded). *rhiz.* short-creeping, woody, with nearly black scales. *fronds* 1ft. to 2ft. long, ½in. to 1¼in. broad, with an acute apex and an entire, revolute edge, the lower part gradually narrowed into a short stem. *sori* oblong, immersed, in a line near the edge. Malaccas and Philippines, 1819.

P. longipes (long-stalked). A garden form of *P. Phymatodes.*

P. longissimum (very long). *rhiz.* wide-creeping, with brown, adpressed scales. *sti.* 3in. to 4in. long, firm. *fronds* 1ft. to 4ft. long, 6in. to 12in. broad, cut nearly to the rachis into numerous sub-entire, erecto-patent lobes, 4in. to 8in. long, ¼in. to ½in. broad. *sori* in close, single rows near the midrib, forming distinct papillæ on the upper surface. North India, &c. SYN. *Phymatodes longissima.*

P. loriceum (armour-clad). *rhiz.* wide-creeping, stout, with black scales. *sti.* sometimes ebeneous, 4in. to 6in. long. *fronds* 1ft. to 1½ft. long, 4in. to 6in. broad; pinnæ close, 2in. to 3in. long, ⅜in.

Polypodium—*continued.*

to ½in. broad, sub-entire, dilated at base on the upper side. *areolæ* usually in two distinct rows, with the small sori often in both. Mexico, &c. SYN. *Goniophlebium loriceum.*

P. l. latipes (broad-stalked). A larger but less rigid form, having dense, dull brown scales, and pinnæ much dilated on both sides at the base. SYNS. *P. harpeodes, P. vacillans.*

P. lucidum (shining). *rhiz.* short-creeping. *sti.* erect, firm, short. *fronds* 6in. to 12in. long, ½in. to ¾in. broad, edge entire, both ends narrowed, both sides very glossy. *sori* confined to the upper part of the frond, not copious. *areolæ* in two or three irregular rows. Venezuela and Brazil. SYNS. *P. nitidum, Campyloneurum rigidum.*

P. lycopodioides (Lycopodium-like). *rhiz.* firm, wide-creeping, with ferruginous scales. *fronds* dimorphous, distant, either sessile or shortly stalked; barren ones 2in. to 4in. long, ½in. to 1in. broad, entire, frequently blunt, gradually narrowed at base; fertile ones narrower and longer. *areolæ* in several rows, those containing the uniseriate sori being largest. Tropical America, &c., 1793. SYN. *Anapeltis lycopodioides.*

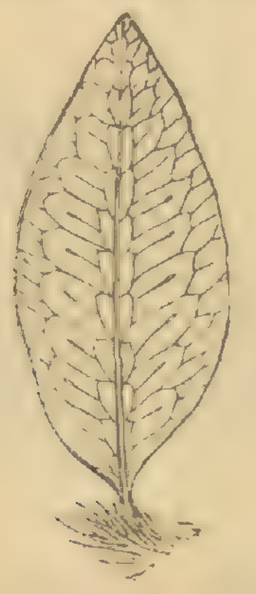

FIG. 238. FROND OF POLYPODIUM LYCOPODIOIDES OWARIENSE.

P. l. owariense (Owara). This variety only differs from the type in the shorter, oval, bluntly-pointed frond. See Fig. 238.

P. macrocarpum (large-fruited). *rhiz.* wide-creeping, stout, densely scaly. *sti.* 1in. to 3in. long, wiry, often flexuous, deciduously scaly. *fronds* 3in. to 4in. long, 1in. or more broad, lanceolate, cut nearly to the rachis into blunt, entire or obscurely toothed pinnæ, ⅛in. broad, dilated at base, and with a rounded sinus between them; lower surface densely scaly. *sori* copious, large. Bolivia to Chili.

P. macrodon (large-toothed). *rhiz.* decumbent. *sti.* 1ft. or more long, scaly below. *fronds* 2ft. to 3ft. long, 1ft. to 1½ft. broad, apex deeply pinnatifid; pinnæ below the apex numerous, lanceolate, the lowest sometimes 1ft. long and 6in. to 8in. broad, cut down to a narrow wing on the rachis into close, lanceolate, pinnatifid pinnules. *sori* small, in rows near the main veins. *areolæ* copious. Philippines, &c., 1840. SYN. *Dictyopteris macrodonta.*

P. macropterum (large-winged). Trunk somewhat arborescent. *sti.* 2ft. or more long, strong, glabrous, angular. *fronds* 4ft. to 6ft. or more long; pinnæ lanceolate, 6in. to 9in. long, 2in. broad, with entire, oblong-falcate lobes, ¼in. to ⅜in. broad, reaching down three-quarters of the way to the midrib. Brazil.

P. madrense (Sierra Madre). *rhiz.* wide-creeping, stout, densely scaly. *sti.* 2in. to 4in. long, firm, erect. *fronds* 3in. to 5in. long, 1½in. to 2in. broad, cut nearly to the rachis into horizontal, entire, blunt pinnæ, ⅛in. broad, with a rounded sinus between them; under side and ebeneous rachis scaly. *sori* copious, large. North-west Mexico, &c.

P. marginellum (slightly-margined). *sti.* densely tufted. *fronds* 3in. to 6in. long, about ⅛in. broad, blunt, gradually tapering into the short stem, naked or slightly hairy on both sides, margined with a distinct, black line. *sori* close, copious, oval or oblong, in rows nearer the midrib than the edge. West Indies. SYN. *Grammitis marginella.*

P. Martensii (Martens'). *rhiz.* wide-creeping, stout, with bright ferruginous scales. *sti.* 1in. to 2in. long, erect, firm. *fronds* 8in. to 12in. long, 3in. to 4in. broad, cut down to the rachis into numerous horizontal, entire pinnæ, ⅙in. broad, distant their own breadth; both surfaces and rachis finely villous. *sori* medial, twelve or more on each side. Mexico.

P. megalodus (picture-like). A variety of *P. androgynum.*

P. membranaceum (membranous). *rhiz.* stout, with lurid-green scales. *sti.* 1in. to 4in. long, erect, firm. *fronds* 1ft. to 3ft. long, 2in. to 6in. broad, with an entire or repand edge, both ends being gradually narrowed. *sori* mostly in two rather irregular rows near the main veins. North India to Ceylon. SYN. *Colysis membranacea.* The variety *grandifolium* has larger fronds, and more copious and irregularly-scattered sori.

P. menisciifolium (Meniscium-leaved). *sti.* 1ft. to 2ft. long, erect, firm, naked. *fronds* 2ft. to 3ft. long, 1ft. or more broad, with an entire, terminal pinna, 6in. to 9in. long, 1½in. to 2in. broad,

Polypodium—*continued.*

and numerous similar ones on each side, all narrowed at base. *sori* and *areolæ* in rows of about four, the former immersed and prominent on the upper side. Brazil, &c., 1840. SYN. *Goniophlebium menisciifolium.*

P. molle (soft). *sti.* 1ft. or more long, stout, with deciduous scales. *fronds* 2ft. to 3ft long, 1ft. to 1½ft. broad; lower pinnæ not reduced, 6in. to 9in. long, 1½in. to 2in. broad, cut to a broadly-winged rachis into oblong, entire or crenated, blunt lobes; under surface finely villous. *sori* small, copious, distant from the midrib. St. Helena. SYNS. *P. Dianæ, Phegopteris mollis.*

P. morbillosum (diseased). A synonym of *P. Heracleum.*

P. musæfolium (Musa-leaved). *rhiz.* woody, with dull brown scales. *fronds* 1ft. to 3ft. long, 3in. to 4in. broad, with an acute or rather blunt point; lower part broadly winged to the base. *sori* small, numerous, sometimes covering nearly the whole surface. Malay Isles. SYN. *Phymatodes musæfolia.*

P. myriocarpum (many-fruited). A variety of *P. pellucidum.*

P. neriifolium (Oleander-leaved). A synonym of *P. brasiliense.*

P. nigrescens (blackish). *rhiz.* stout, adpressedly scaly. *sti.* 1ft. to 1½ft. long, erect, glossy, firm. *fronds* 2ft. to 3ft. long, 1ft. or more broad, cut within 1in., or less, of the rachis into numerous linear-oblong, entire, acuminate lobes, 6in. to 12in. long, 1in. to 2in. broad. *sori* in a single row nearer the midrib than the edge, sunk in a deep cavity, which is prominent on the upper side. India, &c. SYN. *Phymatodes nigrescens.*

P. nigripes (black-stalked). *rhiz.* stout, with black, rigid, ferruginous-edged scales. *sti.* almost 1ft. long, firm, erect, slightly scaly. *fronds* 1ft. long, 6in. to 7in. broad, cut nearly, or below quite, to the rachis into pinnæ, which are about ½in. broad, and slightly crenate towards the bluntish point; under surface furfuraceous. *sori* in single rows on each side the midrib. Venezuela. SYN. *Phlebodium nigripes.*

P. nitidum (shining). A synonym of *P. lucidum.*

P. obliquatum (oblique). *sti.* 1in. or more long, rigid, tufted, naked or villous. *fronds* 8in. to 12in. long, 1½in. to 2in. broad, cut down throughout to the rachis into horizontal or decurved, acute, slightly-sinuated pinnæ, ⅜in. broad, dilated at base, the lower ones being blunt and shorter; edges of the fertile pinnæ sometimes undulated. *sori* sunk in a cavity, four to six on each side. India, &c., 1841.

P. Otites (Otites). A synonym of *P. tenuifolium.*

P. oxylobum (sharply-lobed). A synonym of *P. trifidum.*

P. palmatum (palmately-lobed). *rhiz.* stout, brown-scaly. *sti.* 6in. to 12in. long, erect, firm, glossy. *fronds* 6in. to 18in. long, 8in. to 12in. broad, with a linear or oblong, repand or entire, terminal lobe, and one to six similar ones on each side, 4in. to 6in. long, ½in. to 1½in. broad, narrowed or dilated, slightly adnate at base, those of the barren frond broadest. *sori* in a single row midway between the edge and midrib. Malaccas and Philippines. SYNS. *P. angustatum, Pleuridium palmatum. P. Lindleyanum* is merely a form of this species.

P. papillosum (nippled). *rhiz.* wide-creeping, stout, scaly. *sti.* 4in. to 6in. long, slender, rigid, erect. *fronds* 1ft. or more long, 2in. broad, cut to the rachis into horizontal, close, blunt, entire or slightly crenated pinnæ, ¼in. broad; veins black. *sori* deeply immersed in rows near the edge, the cavities prominent on the upper side. Java and Philippines.

P. Paradiseæ (Paradise). *fronds* 1ft. to 4ft. long, 3in. to 8in., or more, broad, slightly pubescent, deeply pinnatifid, upright, slightly arched at top. *sori* bright golden-yellow, imparting a charming appearance to the plant. Brazil, 1841.

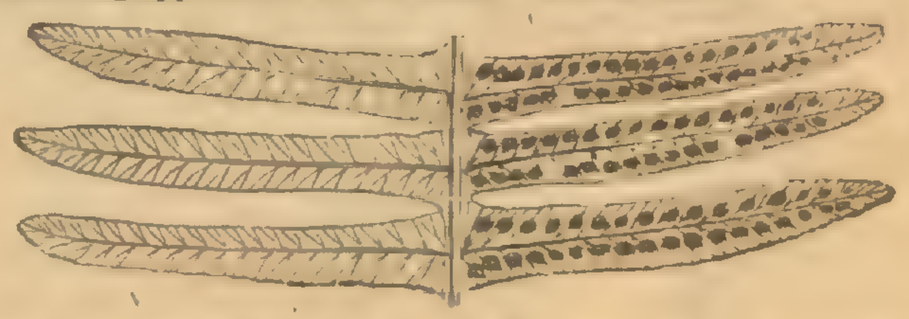

FIG. 239. PORTION OF FROND OF POLYPODIUM PECTINATUM.

P. pectinatum (comb-like). * *rhiz.* fibrillose, stout. *sti.* 2in. to 6in. long, erect, rigid, naked or finely villous. *fronds* 1ft. to 3ft. long, 2in. to 6in. broad, naked or finely villous, cut down to the rachis; pinnæ about ⅛in. broad, close, horizontal, blunt, entire or slightly toothed, the lower ones much reduced. *sori* in long rows. Mexico, &c., 1793. See Fig. 239. (H. G. F. 10.)

P. pellucidum (pellucid-veined). *rhiz.* wide-creeping, stout, densely scaly. *sti.* rigid, erect, 3in. to 6in. long, glossy. *fronds* 3in. to 12in. long, 3in. to 5in. broad, cut nearly to the rachis into entire or sub-acute, close, blunt pinnæ, ¼in. to ⅜in. broad; veinlets beautifully pellucid. *sori* prominent, large. Sandwich Isles. The variety *myriocarpum* is a form with pinnatifid pinnæ.

P. peltideum (shield-like). A garden form of *P. Phymatodes.*

P. pennigerum (feathered). *sti.* 6in. to 12in. long, tufted, slightly scaly. *fronds* 1½ft. to 2ft. long, 8in. to 12in. broad; pinnæ 4in. to 6in. long, nearly 1in. broad, cut half-way down into slightly crenated, blunt, falcate lobes, about ⅛in. broad; lower pinnæ

Polypodium—*continued.*

gradually reduced. *sori* in rows near the midrib. New Zealand, 1835. Greenhouse. SYN. *Goniopteris pennigera.*

P. percussum (sharp-pointed). *rhiz.* wide-creeping, wiry, with adpressed scales. *sti.* distant, 2in. to 3in. long, firm, erect. *fronds* 6in. to 12in. long, ¾in. to 1½in. broad, entire, gradually narrowed towards both ends, with the under side scaly. *sori* round, distinctly immersed, forming a row midway between the edge and midrib. *areolæ* fine, distinct. Brazil, &c. SYN. *Pleopeltis percussa.*

P. persicæfolium (Peach-leaved). *rhiz.* wide-creeping, with dull brown scales. *sti.* 6in. to 12in. long, firm, naked. *fronds* 2ft. to 3ft. long, 8in. to 12in. broad, decurved; pinnæ 3in. to 6in. long, nearly 1in. broad, distant, with an acuminate apex, a slightly-toothed edge, and the base gradually narrowed, the lower ones being distinctly stalked. *sori* immersed, uniseriate. *areolæ* in about three rows. Java. SYNS. *P. cuspidatum*, *Goniophlebium persicæfolium.* The variety *grandidens* is a more deeply-toothed form.

P. Phegopteris (Phegopteris).* Beech Polypody. *rhiz.* wide-creeping, slender. *sti.* slender, 6in. to 9in. long, naked, except towards the base. *fronds* 6in. to 9in. long, 4in. to 6in. broad, almost deltoid, slightly hairy beneath; lower pinnæ 2in. to 3in. long, ½in. to ¾in. broad, cut three-quarters of the way to the rachis into close, entire or slightly-toothed, blunt lobes, ⅛in. broad, the lowest pair deflexed. *sori* nearer the edge than the midrib. Northern hemisphere (Britain).

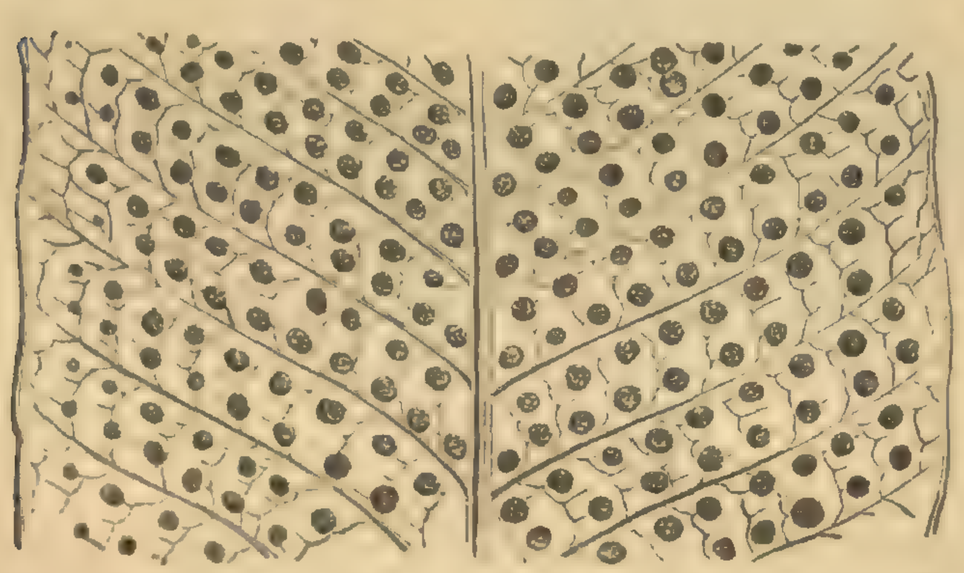

FIG. 240. PORTION OF FROND OF POLYPODIUM PHYLLITIDIS.

P. Phyllitidis (Phyllitidis). *rhiz.* hypogæous, stout, brown-scaly. *sti.* short, scattered or slightly tufted, or none. *fronds* 1ft. to 3ft. long, 1in. to 4in. broad, with an acute point and an entire or slightly sinuated edge, the lower part gradually narrowed; upper surface often cretaceous-dotted. *areolæ* in rows of six to twelve, between the edge and midrib, usually with two sori in each. Florida to South Brazil, 1793. See Fig. 240. SYN. *Campyloneurum Phyllitidis.*

P. Phymatodes (Phymatodes). *rhiz.* woody, wide-creeping, with dark brown scales. *sti.* 3in. to 12in. long, glossy, firm, erect. *fronds* varying from simple, oblong-lanceolate, to 2ft. to 3ft. long and 1ft. broad, cut down to the broadly-winged rachis into numerous lanceolate-oblong, entire, acuminate lobes, 4in. to 8in. long, and 1in. to 1½in. broad. *sori* large, immersed, scattered, or one or two-seriate. East Indies, &c., 1823. SYN. *Phymatodes vulgaris.* *P. longipes*, *P. peltideum*, and *P. terminale*, are merely garden varieties of this species.

FIG. 241. PORTION OF CREEPING RHIZOME (WITH FRONDS) OF POLYPODIUM PILOSELLOIDES.

Polypodium—*continued.*

P. piloselloides (Pilosella-like).* *rhiz.* very wide-creeping, scandent, with squarrose scales. *fronds* dimorphous; barren ones 1in. to 3in. long, ₂in. to ¾in. broad, oblong, entire; fertile ones narrower and longer; both on short, ciliated stems, naked, hairy, or scaly. *sori* large, uniseriate, confined to the large costal areolæ. Tropical America, 1793. See Fig. 241. (H. G. F. 18.) SYNS. *Goniophlebium piloselloides*, *Lopholepis piloselloides.* In the variety *ciliatum*, the fertile fronds are so narrow that the sori project along the edge.

P. platyphyllum (broad-leaved). *rhiz.* woody, with nearly black scales. *sti.* 3in. to 4in. long, erect, strong. *fronds* 1ft. to 1½ft. long, 2in. to 4in. broad, the edge entire, the point acute, upper surface dirty-white dotted. *sori* immersed, in single rows between the main veins, eight or nine between the midrib and edge. Java. SYN. *P. crassinervium.*

P. plebeium (plebeian). *rhiz.* wide-creeping, stout, grey-scaly. *sti.* strong, erect, 4in. to 8in. long, castaneous. *fronds* 6in. to 12in. long, 3in. to 6in. broad, deltoid-ovate, cut nearly or quite to the rachis; pinnæ spreading, entire or obscurely crenated, ¼in. to ⅜in. broad, the lowest not reduced; under side and rachis scaly. *sori* copious. Mexico to Peru.

P. plectolepis (plaited-scaled). *rhiz.* stout; scales ferruginous, squarrose. *sti.* firm, glossy, stramineous, 6in. to 12in. long. *fronds* 1ft. to 2ft. long, 1ft. broad; pinnæ spreading, numerous, 4in. to 6in. long, about ½in. broad, gradually narrowed from base to point, the edge crenate; both sides finely pubescent. *sori* and *areolæ* in a single series. Mexico and Guatemala. SYN. *Goniophlebium plectolepis.*

P. plesiosorum.* *rhiz.* stout, reddish-scaly. *sti.* firm, erect, 2in. to 4in. long, glossy. *fronds* 6in. to 12in. long, 4in. to 6in. broad, cut to the rachis; pinnæ close, entire, about ½in. broad, gradually narrowed upwards, slightly dilated on both sides at the base. *sori* prominent, in a single row close to the midrib (whence the specific name). *areolæ* usually in two rows. Mexico to Venezuela. SYNS. *P. colpodes*, *P. gonatodes*, *P. rhodopleuron.*

P. Plumula (feathered). A synonym of *P. elasticum.*

P. proliferum (proliferous). *rhiz.* stout, creeping. *sti.* 2in. to 8in. long, spreading. *fronds* 1ft. to 2ft. or more long, 6in. to 12in. broad, erect or decumbent, often elongated and rooting at the point, and copiously branched from the axils; pinnæ 4in. to 6in. long, ½in. to ¾in. broad, broadest at base, truncate or cordate, the edge bluntly lobed; under side and rachis sometimes slightly pubescent. *sori* medial, oval, sometimes confluent. India, China, &c., 1820. SYN. *Goniopteris prolifera.*

P. propinquum (allied). *rhiz.* wide-creeping, woody, with bright ferruginous scales. *fronds* dimorphous; barren ones 4in. to 9in. long, 3in. to 4in. broad, cut half or three-quarters of the way into acute or bluntish lobes; fertile ones 1½ft. to 3ft. long, often 1ft. broad, with a distinct stem, and lobes 4in. to 6in. long, ½in. to ¾in. broad, reaching nearly or quite to the rachis. *sori* in a row near the midrib, placed at the junction of several veinlets. *areolæ* copious. India, &c. SYNS. *P. Wildenovii* (H. G. F. 35), *Drynaria propinqua.*

P. pruinatum (frosted). Basal scales ferruginous. *fronds* sessile, densely tufted, oblanceolate, erect, ½in. long, ¼in. broad, blunt, deltoid at base, cut more than half way to the rachis into five or six-jugate, blunt lobes; surfaces hairy, the lower slightly pruinose. *sori* round, four to the central lobes, medial. Chontales, Nicaragua.

P. punctatum rugulosum (dotted, slightly wrinkled). *rhiz.* wide-creeping, firm, villous. *sti.* scattered, 1ft. to 2ft. long, firm, erect, polished, viscid. *fronds* 1ft. to 4ft. long, 6in. to 2ft. broad; lower pinnæ sometimes 1ft. to 2ft. long, deltoid; pinnules close, lanceolate; rachis deep purplish-brown, and densely viscid; under side slightly hairy. *sori* copious, marginal. New Zealand, Australia, &c. Greenhouse. SYNS. *P. rugulosum*, *Phegopteris rugulosa.*

P. pustulatum (blistered).* Scented Polypody. *rhiz.* much-branched, wide-scandent, woody, with dark brown, squarrose scales. *sti.* 1in. to 3in. long. *fronds* varying from entire, 3in. to 9in. long, and ¼in. to ½in. broad, narrowed to both ends, to 1ft. to 1½ft. long, and 3in. to 4in. broad, cut down to a broadly-winged rachis throughout into lanceolate lobes. *sori* immersed, uniseriate, sub-marginal. *areolæ* rather large, irregular. New Zealand and Australia. Greenhouse. See Fig. 242. SYN. *Phymatodes pustulata.*

P. quercifolium (Oak-leaved).* *rhiz.* stout, with bright brown scales, nearly ½in. long. *fronds* dimorphous; barren ones 3in. to 12in. long, 2in. to 6in. broad, sessile, brown, rigid, bluntly lobed often half way down; fertile ones on long stalks, 2ft. to 3ft. long, 1ft. or more broad, cut nearly to the rachis into erecto-patent, entire lobes, 6in. to 9in. long, ½in. to 1½in. broad; main veins distinct to the edge, with four to six quadrangular areolæ between them between the midrib and edge, inclosing each two large sori and copious lesser areolæ. India, Queensland, &c., 1824. SYN. *Drynaria quercifolia.*

P. Reinwardtii (Reinwardt's). A variety of *P. subauriculatum.*

P. repens (creeping). *rhiz.* wide-creeping, tortuous, firm, slender, with deciduous scales. *sti.* 1in. to 5in. long, firm, scattered. *fronds* 6in. to 18in. long, 1in. to 3in. broad, slightly sinuated or entire, the base gradually narrowed, the point acute; both sides

Polypodium—*continued.*

opaque. *areolæ* in rows of five to ten between the edges and midrib, with two sori in each. West Indies, &c., 1810.

P. reptans (creeping). *sti.* 1in. to 8in. long, slender, wiry. *fronds* 4in. to 12in. long, 1in. to 3in. broad, spreading, often decumbent and rooting; pinnæ ½in. to 1½in. long, about ½in. broad, entire or bluntly lobed, often auricled at base, the lower ones stalked; under side and rachis sometimes slightly hairy. West Indies. A very variable species. SYN. *Campyloneurum repens.* The form *asplenioides* is more erect, and larger.

P. rhodopleuron (red-veined). A synonym of *P. plesiosorum.*

P. rigidulum (slightly rigid). *rhiz.* wide-creeping, stout, with glossy-brown scales. *fronds* dimorphous; barren one sessile, 6in. to 9in. long, 3in. to 4in. broad, cut about half way to the rachis into blunt lobes; fertile one 2ft. to 4ft. long, 1ft. to 1½ft. broad, long-stalked, pinnate; pinnæ 6in. to 12in. long, ¼in. to ⅜in. broad, 1in. or more apart, narrowed or stalked at base, point acuminate, edge inciso-crenate. *sori* in a single row half way between the midrib and edge. *areolæ* copious. Queensland, &c. (H. G. F. 5.) SYNS. *P. diversifolium, Drynaria rigidula.*

FIG. 242. ENTIRE FROND OF POLYPODIUM PUSTULATUM.

P. rufescens (reddish). *rhiz.* short-creeping. *sti.* 1ft. to 1½ft. long, erect, firm, naked. *fronds* length of stipes, 9in. to 12in. broad, almost deltoid; lower pinnæ largest, deltoid, 6in. to 8in. long, 3in. to 4in. broad; pinnules lanceolate, unequal-sided, bluntly lobed, the lowest nearly down to the rachis. *sori* medial. Java, Queensland, &c. SYN. *Phegopteris rufescens.*

P. rufulum (reddish). A synonym of *P. lepidopteris rufulum.*

P. rugulosum (wrinkled). A synonym of *P. punctatum rugulosum.*

P. rupestre (rock-loving).* *rhiz.* woody, with dark brown scales. *sti.* 4in. to 8in. long, firm, erect. *fronds* 4in. to 8in. long, 1in. to 1½in. broad, with an entire or obscurely repand edge, and an acuminate apex. *sori* in two rows between the main veins, not immersed, six to eight between the edge and midrib. Java and Philippines. SYN. *Pleuridium rupestre.*

P. rupestre (rock-loving), of R. Brown. A synonym of *P. serpens.*

Polypodium—*continued.*

P. sandvicense (Sandwich Isles). A synonym of *P. stegnogrammoides.*

P. Schkuhri (Schkuhr's). A synonym of *P. elasticum.*

P. Scouleri (Scouler's).* *rhiz.* wide-creeping, stout, with dull brown scales. *sti.* firm, erect, naked, 3in. to 4in. long. *fronds* 6in. to 12in. long, 4in. to 8in. broad, cut to the rachis into close, sub-entire, blunt pinnæ, ½in. to ¾in. broad. *sori* very large, in a single row close to the midrib. North-west America. SYN. *Goniophlebium Scouleri.*

P. sepultum (inclosed). A synonym of *P. lepidopteris sepultum.*

P. serpens (creeping). *rhiz.* firm, wide-creeping, clothed with ferruginous scales. *sti.* firm, erect, ½in. to 3in. long. *fronds* dimorphous; barren ones round or elliptical; fertile ones longer and narrower, 4in. to 6in. long, ½in. to ¾in. broad; under surface tomentose. *sori* large, prominent, scattered, at length covering the whole upper portion of the frond. Australia and New Zealand. Greenhouse. SYNS. *P. rupestre, Niphobolus rupestris.*

P. serpens (creeping), of Swartz. A synonym of *P. Swartzii.*

P. serrulatum (slightly saw-edged). *rhiz.* fibrillose, wide-creeping. *sti.* slender, naked, short, tufted. *fronds* 3in. to 6in. long, about ¼in. broad, the upper part, occasionally the whole, almost entire, but generally pectinato-pinnatifid, with erecto-patent, rigid lobes. *sori* oblong, confluent. West Indies, &c., 1823. (H. G. F. 44, under name of *Xiphopteris serrulata.*)

P. Sieberianum (Sieber's). A synonym of *P. cyatheæfolium.*

P. sinuosum (sinuate). "*rhiz.* forming a crust which enwraps the matrix, clothed with peltate scales, black in the middle, and white round the edge, the stem arising from a conical protuberance, 1in. to 2in. long, firm, naked" (Baker). *fronds* dimorphous; barren ones 3in. to 6in. long, ¼in. to 1in. broad, with an entire edge; fertile ones longer, and with a repand edge. *sori* round or oblong, large, marginal, or nearly so, immersed. Malaccas, &c. (H. S. F. 274.) SYN. *Phymatodes sinuosa.*

P. sororium (related). *rhiz.* wide-creeping, stout, with pale brown scales. *sti.* firm, naked, erect, 6in. to 12in. long. *fronds* 1ft. to 2ft. long, 6in. to 9in. broad; lower pinnæ largest, sessile, 4in. to 6in. long, about ½in. broad, with an entire or obscurely undulated edge, and an acuminate apex. *sori* in distinct rows, nearer the midrib than the edge. Cuba to Peru.

P. spectabile (remarkable). A synonym of *Nephrodium villosum.*

P. spectrum (spectral). *rhiz.* wide-creeping, woody, with deciduous, black scales. *sti.* 3in. to 4in. long, erect, naked, firm, distant. *fronds* cordate-hastate, 6in. to 9in. each way, the apex acuminate; lateral lobes rounded or acute; basal lobes deep, occasionally imbricated; edge not toothed. *sori* irregularly scattered, small, not copious. Sandwich Isles. SYN. *Colysis spectra.*

P. sporadocarpum (spore-fruited). A synonym of *P. aureum areolatum.*

P. squamatum (scaly). *rhiz.* wide-creeping, stout, clothed with adpressed scales. *sti.* erect, 6in. to 12in. long, rigid, scaly. *fronds* 6in. to 12in. long, 2in. to 4in. broad, cut nearly or quite to the rachis into entire, bluntish pinnæ, 1in. to 2in. long, about ⅛in. broad, with a good space between them, dilated, and frequently united at the base; rachis and under surface densely scaly. *sori* large, copious. West Indies and Mexico to Peru. SYN. *Lepicystis squamata.*

FIG. 243. FROND OF POLYPODIUM STIGMATICUM.

MISSOURI BOTANICAL GARDEN

Polypodium—*continued.*

P. stegnogrammoides (Stegnogramma-like). *cau.* sub-arborescent. *sti.* 1½ft. to 2ft. long, erect, firm, pubescent upwards. *fronds* 2ft. to 3ft. long, 1ft. or more broad; pinnæ 6in. to 9in. long, 1½in. broad, the edge bluntly lobed about a quarter the way down, the apex acuminate; rachis and veins beneath slightly hairy. *sori* in rows near the midrib. Sandwich Isles. SYNS. *P. sandvicense, Goniopteris stegnogrammoides.*

P. stigmaticum (dotted). *rhiz.* slender, wide-creeping, fibrillose. *fronds* sub-sessile, 4in. to 5in. long, ⅛in. to ¾in. broad, entire, gradually narrowed towards both ends, both sides naked. *sori* uniserial. *areolæ* fine, copious, with distinct, free veinlets. Columbia. See Fig. 243. SYN. *Anapeltis venosa.*

P. stigmosum (dotted). *rhiz.* short-creeping, with ferruginous scales. *sti.* somewhat tufted, firm, erect, 1in. to 6in. long. *fronds* 1½ft. to 2ft. long, 1in. to 3in. broad, the lower part gradually narrowed, the apex acuminate, the edge entire; lower surface tomentose. *sori* very small, in several rows between the transverse veinlets, continuous, occasionally covering the whole frond except the base. North India, &c., 1823. SYN. *Niphobolus costatus.*

P. subauriculatum (slightly-eared). *rhiz.* wide-creeping, with dull brown scales. *sti.* firm, erect, 6in. to 12in. long, naked, glossy. *fronds* 2ft. to 3ft. long, 8in. to 12in. broad, decurved, oblong-lanceolate; pinnæ 4in. to 6in. long, ½in. to 1in. broad, sessile, the base rounded or auricled, the edge slightly toothed or entire. *sori* distinctly immersed, uniserial. *areolæ* in two or three rows. Himalayas, &c. SYN. *Schellolepis subauriculata.* The variety *Reinwardtii* is crenate instead of dentate.

P. subfalcatum (slightly sickle-shaped). *sti.* less than 1in. long, hairy, densely tufted. *fronds* 6in. to 9in. long, 1in. to 1½in. broad; pinnæ close, spreading, toothed one-third to half way down, decurrent at base, the lower ones gradually reduced; both surfaces slightly villous. *sori* in rows, one to each tooth. Malay Isles, 1839.

P. subpetiolatum (shortly-stalked). *rhiz.* wide-creeping, stout, with ferruginous scales. *sti.* 4in. to 6in. long, stramineous, firm. *fronds* 1ft. or more long, 6in. to 8in. broad; pinnæ 3in. to 4in. long, ½in. broad, with a slightly crenate edge and a blunt point, the lower ones rounded at base, sub-petiolate; rachis and both surfaces finely villous. *sori* in rows nearer the midrib than the edge. Mexico, &c., 1845. *P. biserratum* is, according to Mr. Baker, merely a form of this species, with much more elongated fronds, more numerous pinnæ, and more distant sori.

P. surrucuchense (Surruchu). *rhiz.* stout, densely grey-scaly. *sti.* firm, 6in. to 12in. long, glossy. *fronds* 1ft. to 2ft. long, 8in. to 12in. broad; pinnæ 4in. to 6in. long, about ½in. broad, erecto-patent, numerous, the base sub-cuneate, the edge entire. *sori* prominent, in a single series with the areolæ. West Indies to Ecuador. SYN. *Goniophlebium surrucuchense.*

P. Swartzii (Swartz's). *rhiz.* slender, wide-creeping, with ferruginous scales. *sti.* slender, ½in. to 1in. long, naked. *fronds* 2in. to 4in. long, ¼in. to 1in. broad, nearly or quite uniform, gradually narrowed to both ends, with a slightly lobed or entire edge. *sori* uniserial on free veinlets. *areolæ* fine, copious, irregular. West Indies and Cayenne. SYNS. *P. serpens, Anapeltis serpens.*

FIG. 244. RHIZOME OF POLYPODIUM FILIPES, WITH FRONDS.

P. tenellum (tender). *rhiz.* woody, wide-creeping, scaly when young. *sti.* firm, 2in. to 3in. long, nearly naked, jointed near the base. *fronds* 1ft. to 2ft. or more long, 2in. to 4in. broad, pendent; pinnæ 2in. to 3in. long, ⅓in. broad, entire or obscurely crenated, narrowed towards both ends. *sori* in rows near the edge. Australia, &c., 1823. Greenhouse. SYN. *Arthopteris tenella. P. Filipes* is a young state of this species. See Fig. 244.

P. tenuifolium (slender-fronded). *rhiz.* stout, with reddish-brown, fibrillose scales. *sti.* slender, erect, 2in. to 3in. long. *fronds* 8in. to 12in. long, 1½in. to 2in. broad, cut to the rachis; pinnæ distant, entire or slightly crenated, linear, blunt. *sori* slightly immersed, in two rows of six to ten each to a pinna. SYN. *P. Otites.*

Polypodium—*continued.*

P. terminale (terminal). A garden form of *P. Phymatodes.*

P. tetragonum (four-angled). A synonym of *P. androgynum.*

P. thyssanolepis (fringed-scaled). *rhiz.* ⅛in. long, firm, slender, wide-creeping, with dense, pale brown scales. *sti.* erect, 3in. to 12in. long, stiff, scaly. *fronds* 3in. to 9in. long, 2in. to 4in. broad, lanceolate, simply pinnate; pinnæ ¼in. to ½in. broad, blunt, entire, distant, ligulate, ascending, all except lowest (which are not reduced) dilated at base; lower surface densely clothed with minute, ciliated, brown, lepidote scales. *sori* and *areolæ* uniseriate. Mexico to Peru. SYN. *Goniophlebium thyssanolepis.*

P. trichodes (hair-like). *sti.* scaly at base, and hirsute. *fronds* 1ft. to 4ft. or more long, bi-tripinnate; segments finely divided, covered with minute, white hairs. East Indies, 1840. Greenhouse. SYN. *Phegopteris trichodes.*

P. trichomanoides (Trichomanes-like).* *sti.* short, densely tufted, deciduously hairy. *fronds* 3in. to 6in. long, about ¼in. broad, cut to the rachis: pinnæ less than one line broad, close, linear-oblong, blunt; surfaces sometimes hairy. *sori* one in each pinna, near the base. West Indies, &c., 1822.

P. trifidum (thrice-cut). *rhiz.* stout, with bright ferruginous scales. *sti.* 3in. to 6in. long, firm, erect, glossy. *fronds* 6in. to 12in. long, 6in. to 8in. broad, with a large, linear, terminal lobe, and one to five similar ones on each side, which reach down within ¼in. of the rachis, and are 4in. to 6in. long, ½in. to 1¼in. broad, narrowed to the point, the edge obscurely repand or entire. *sori* uniseriate, and one only between each main vein. *areolæ* copious, between the transverse veinlets. India, &c. SYNS. *P. oxylobum, Pleuridium oxylobum.*

P. trifurcatum (thrice-forked). *rhiz.* creeping, stout, densely scaly. *sti.* 3in. to 5in. long, close, villous, frequently bent. *fronds* 6in. to 9in. long, 1in. or more broad, with blunt, entire, broad lobes reaching from one-third to half way down. *sori* copious, mainly in two rows in each lobe, immersed. West Indies to Peru, 1820.

P. triquetrum (three-sided). *rhiz.* woody, stout, with dense, almost scarious scales. *sti.* 4in. to 8in. long, distant, firm, erect. *fronds*, barren ones 6in. to 9in. long, 2in. to 3in. broad, with an entire edge, and an acuminate apex; fertile ones rather narrower and longer. *sori* in two close rows between the main veins, five to eight between the midrib and edge, not immersed. Java. SYN. *Pleuridium triquetrum.*

P. unidentatum (once-toothed). *sti.* 1ft. long, tufted, with dark brown scales. *fronds* 2ft. to 3ft. long, 1ft. or more broad, deltoid; lower pinnæ largest, deltoid, 6in. to 9in. long, 4in. to 5in. broad; pinnules lanceolate, the lower segments distinct, ovate-oblong, deeply pinnatifid, with slightly-toothed lobes. *sori* sub-marginal. Sandwich Isles. This species is rather rare in cultivation. SYN. *Phegopteris unidentata.*

FIG. 245. CREEPING RHIZOME OF POLYPODIUM VACCINIIFOLIUM.

P. vacciniifolium (Whortleberry-leaved).* *rhiz.* very wide-creeping, slender, clothed with grey or ferruginous scales. *fronds* dimorphous, almost sessile, entire; barren ones 1in. to 2in. long, ⅓in. to ½in. broad, roundish or elliptical, obtuse; fertile ones linear or ligulate. *sori* large, uniseriate. Jamaica to Paraguay. See Fig. 245. SYN. *Lophol epis vaccinifolia.*

P. vacillans (changing). A synonym of *P. loriceum latipes.*

Polypodium—*continued.*

P. venosum (veined). A synonym of *P. lycopodioides.*

P. venustum (charming). A synonym of *P. himalayense.*

P. verrucosum (warted).* *sti.* firm, erect, 1½ft. to 2ft. long, terete, naked. *fronds* 3ft. to 4ft. long, 1ft. broad; pinnæ 6in. to 8in. long, ½in. to ¾in. broad, entire; rachis and both surfaces sometimes slightly hairy. *sori* confined to the inner row of areolæ, firm, immersed, forming very distinct papillæ on the upper side. Philippines and Malaccas. (H. G. F. 41.) SYN. *Schellolepis verrucosa.*

FIG. 246. POLYPODIUM VULGARE, showing Habit and Under Surface of Portion of detached Frond.

P. vulgare (common). Adder's Fern; Brake-root; Golden Maidenhair; Wall Fern; Wood Fern. *rhiz.* stout, with bright ferruginous scales. *sti.* firm, erect, 2in. to 4in. long, stramineous. *fronds* 6in. to 12in. long, 3in. to 6in. broad, cut nearly or quite to the rachis; pinnæ ¼in. to ½in. broad, close, entire or slightly toothed, usually blunt. *sori* large, uniseriate. Temperate regions (Britain, &c.). See Fig. 246. Of this species, there are many varieties. The following are the most desirable.

P. v. auritum (eared). This differs from the type in being auriculate at the base of the pinnæ, on the upper, the lower, or both, margins. The fronds are 10in. to 15in. long, and over 2in. wide.

P. v. bifidum (twice-cut). A variety with fronds 10in. to 15in. high and 3in. wide, with the lobes forked, or sometimes bifurcate.

FIG. 247. FROND OF POLYPODIUM VULGARE CAMBRICUM.

Polypodium—*continued.*

P. v. cambricum (Welsh).* *fronds* 12in. to 20in. long, 4in. to 8in. wide, broadly ovate, bipinnatifid; pinnæ ovate-lanceolate; pinnules imbricated, and serrated on the margins. One of the earliest-known, best, and most distinct, forms. See Fig. 247.

P. v. compositum (compound). *fronds* 1ft. to 1½ft. long, about 4in. wide; some of them furcate on the points of the pinnæ, others partly forked and partly serrate, others much enlarged, and sometimes eared.

P. v. cristatum (crested). *fronds* about 15in. long, 3in. to 4in. wide, the apex bifid, each branch again forking, and often becoming crested; points of all the pinnæ crested and curled. A handsome and very distinct variety.

FIG. 248. POLYPODIUM VULGARE ELEGANTISSIMUM.

P. v. elegantissimum (most elegant).* A form with very finely-divided fronds. See Fig. 248.

P. v. marginatum (margined). *fronds* about 1ft. long, linear-lanceolate; pinnæ unequally, sometimes deeply, serrate.

P. v. multifido-cristatum (multifid-crested). A form with fronds 6in. to 10in. long, 3in. of which have only a narrow wing on each side of the stipes, but they are much forked upwards, and produced in a dense, multifid crest.

P. v. omnilacerum (wholly-torn). *fronds* pinnatifid; pinnæ deeply lobed, similar to *cambricum*, but the lobes are not imbricated, and the tip of each pinna is more lengthened out. A handsome and rare variety.

P. v. pulcherrimum (very beautiful). *fronds* 1ft. or more long, about 6in. wide, very similar to those of *cambricum*, the apex deeply serrated. A grand variety.

P. v. semilacerum (half-torn). *fronds* 1ft. to 1½ft. long, 5in. to 6in. wide, below deeply bipinnatifid, pinnate towards the apex; pinnæ irregularly toothed. Ireland. A handsome form.

P. v. suprasoriferum (sori-bearing above). *fronds* 10in. to 12in. long, narrow. *sori* frequently produced at the margins of the upper surface. South of England. A very singular and rare plant.

P. v. variegatum (variegated). A pretty, but somewhat uncertain, form, distinctly spotted and striped with whitish-yellow.

P. Wildenovii (Wildenow's). A synonym of *P. propinquum.*

POLYPODY. *See* **Polypodium.**

POLYPORUS (from the Greek *polyporus*, having many outlets; in allusion to the many openings or pores on the lower surface of the pileus). A genus of Fungi, belonging to the *Hymenomycetes*, or those in which the spores are formed on the tips of small projections from larger cells (of which each gives off four spores) on the surface (hymenium) of a definite part of the Fungus. *See* **Mushrooms.** The species of *Polyporus* differ from the true Mushrooms in that, while the latter bear the hymenium on the gills, the former bear it in a number of small tubes packed together to form a layer of peculiar aspect and texture on the lower surface of the cap, or pileus. They are usually dry and hard in texture, after a short time, and are rather long lived. They, at first, emit an acid smell, but afterwards are nearly without smell. They vary in form, and grow indefinitely. Those parasitic on trees usually have the pileus sessile, and fixed

Polyporus—*continued.*

by one side to the trunk of the tree. They often continue to grow slowly for many years, and reach a size of from 1in. or 2in. to 3ft. across, by several inches in thickness in the middle. From their dry texture, it is easy to preserve them as herbarium specimens; but insects are very apt to eat and destroy them when dried. Old trees of various kinds very frequently have Fungi of this genus growing on their stems, the mycelium penetrating and drawing nourishment from the wood, and the pileus often remaining for many years on the stem, very often near its base. It seems probable that the species of *Polyporus* do not live on quite healthy trees, but on those already weakened by some other cause. Our knowledge of their importance as parasites is due largely to R. Hartig, the well-known authority on the diseases of forest-trees. He has traced and described the effects produced by *P. annosus*, Fr. (under the name of *Trametes radiciperda*), on various trees, by *P. fulvus* on the Silver Fir, by *P. borealis* on the Spruce, by *P. vaporarius* on Spruce and Firs, by *P. mollis* on Firs, by *P. igniarius* on numerous forest-trees (Dicotyledons) and fruit-trees, by *P. dryadeus* on Oaks, and by *P. sulphureus* on many forest-trees (Dicotyledons) and on Pear-trees. Numerous other instances of parasitism could be added. Further details need not here be entered into, it being sufficient to say that the species of *Polyporus* are not of frequent occurrence in gardens and pleasure-grounds. The wood diseased by the presence of the Fungus becomes soft and rotten, and a tree infested with *Polyporus* may be regarded as doomed, sooner or later, to perish from the action of the Fungus on the wood. It is well, if the tree can be at once removed, to cut it down and have it used as firewood, rather than to allow the Fungus to distribute its myriads of spores to injure other trees.

POLYPREMUM (of Adanson). A synonym of **Valerianella** (which *see*).

POLYPTERIS (of Nuttall). Included under **Palafoxia** (which *see*).

POLYSPORA. Included under **Gordonia** (which *see*).

POLYSTACHYA (from *poly*, many, and *stachys*, a spike; alluding to the inflorescence of some of the species). SYNS. *Encyclia, Epiphora.* ORD. *Orchideæ.* A genus comprising about forty species of stove, epiphytal orchids, mostly tropical and South African, a few being found in India, Malaya, and tropical America. Flowers usually small; sepals connivent or almost spreading, the dorsal one free, the lateral ones sometimes much broader, adnate to the foot of the column; petals similar to the dorsal sepal, or narrower; lateral lobes of lip somewhat prominent, erect, the middle one spreading or recurved, and undivided; column sometimes very short; pollen masses, four; racemes many, short, forming a loose, narrow panicle, or solitary and simple, on a leafy stem; peduncle terminal. Leaves few, distichous, oblong or narrow, base contracted into a sheath. The species are rather interesting plants. Those best known to cultivation are described below; they require culture similar to **Burlingtonia** (which *see*).

P. bracteosa (bracted). *fl.* yellow; sepals brown at base; lip broadly oblong, revolute, the lateral lobes brown within; bracts lanceolate, acuminate, concave, at length leafy; raceme nodding, pubescent. *l.* solitary, petiolate, oblong-ovate, acute. Pseudo-bulbs almost round, compressed, aggregate. Sierra Leone, 1838. (B. M. 4161.)

P. galeata (helmet-shaped). *fl.*, perigone green, spotted with red; sepals mucronate; petals minute, oblong-spathulate; lip greenish-white, fleshy, trilobed, the middle lobe cordate, acute; peduncles terminal, generally one-flowered. *l.* linear-oblong, fleshy. Pseudo-bulbs small, one-leaved. Sierra Leone, 1837. (B. M. 3767, under name of *P. grandiflora.*)

P. hypocrita (hypocritical). *fl.* light green, with a few brown spots at the base of the blunt chin; lip whitish, mealy, the middle lobe very much crisped. Western tropical Africa, 1882. This species is very similar to *P. luteola*, but larger.

P. lineata (lined). *fl.* greenish, striped with brown, minute, disposed in spikes. *l.* linear-ligulate. Pseudo-bulbs pyriform. Guatemala, 1870. (Ref. B. 80.) The Mexican variety, *elatior*, is rather larger in all its parts. (Ref. B. 81.)

P. luteola (yellowish). *fl.* yellowish-green, minute, disposed in oblong, remote, dense-flowered spikelets, 1in. to 3in. long. *l.* oblong-lanceolate, acute, plicate, many-nerved, sheathed at base, distichous, shorter than the scape, recurved at apex. Stem thickened at base. Mexico, 1818. (H. E. F. 103.) SYN. *Dendrobium polystachyon* (L. B. C. 428; L. C. B. 20).

P. puberula (puberulous). *fl.* green, pubescent, disposed in paniculate, thyrsiform spikes. *l.* lanceolate, seven-nerved, longer than the scape. Pseudo-bulbs ovate. Sierra Leone, 1822. (B. R. 851.)

P. pubescens (pubescent). *fl.* bright yellow, streaked with red, few, fragrant, terminating an ancipitous, flexuous scape; lip small, trident-shaped, bearded on the inside with long hairs. *l.* binate, oblong-linear, flat. Delagoa Bay, 1838. (B. M. 5586.) SYN. *Epiphora pubescens.*

P. rufinula (reddish). *fl.* in a few-flowered, simple, slightly hairy raceme; sepals cinnamon-brown outside, greenish inside, washed with light brown on the borders; petals greenish, with brown tips; lip yellowish on disk, the front borders light purple, with a rather long ridge, and the furfuraceous surface caused by fragile hairs. *l.* narrow-ligulate, blunt, in pairs at the flowering season. Pseudo-bulbs stick-like, thickened at base, 2in. or less long. Zanzibar, 1879.

POLYSTICHUM. Included under **Aspidium** (which *see*).

POLYTÆNIUM. Included under *Antrophyum.*

POLYTHRIX. A synonym of **Crossandra** (which *see*).

POLYXENA (named after Polyxena, the daughter of Priam, beloved by Achilles). SYNS. *Manlilia, Polyanthes* (of Jacquin). ORD. *Liliaceæ.* A genus comprising about seven species of greenhouse, South African, bulbous plants, included, by Mr. Baker, as a section of *Massonia.* Flowers sometimes very short, sometimes long, loosely spicate or racemose; perianth tube cylindrical or slightly swollen above; lobes six, sub-equal, much shorter than the tube; scape simple below the inflorescence, short; racemes frequently shorter than the leaves. Radical leaves two, spreading or erect, sub-sessile or petiolate. *P. odorata* and *P. pygmæa*, the only species which call for mention here, require culture similar to **Massonia** (which *see*).

P. odorata (odorous). *fl.* white, small, Hyacinth-like, deliciously sweet-scented, disposed in a dense corymb, which is seated between the pair of leaves. October. *l.* erect, lanceolate, 3in. to 5in. high. 1871. A pretty plant. (B. M. 5891, under name of *Massonia odorata.*)

P. pygmæa (pigmy). This is the correct name of the plant described in this work under name of *Massonia ensifolia.*

POLYZONE. A synonym of *Darwinia.*

POMACEÆ. Included under *Rosaceæ.*

POMADERRIS (from *poma*, a lid, and *derris*, a skin; alluding to the membranous covering of the capsule). ORD. *Rhamneæ.* A genus comprising eighteen species of greenhouse, evergreen shrubs, natives of the Southern or Eastern regions of Australia, or of New Zealand. Flowers pedicellate, in small, umbel-like cymes, usually forming terminal panicles or corymbs, or rarely solitary in the axils of the leaves; calyx five-lobed, deciduous or reflexed; petals concave or nearly flat, or none. Leaves alternate, penni-veined; under surface, as well as the branches, white, hoary, or rusty with tomentum, often mixed with, or concealed by, silky hairs. The species thrive in a compost of peat and sandy loam. Propagation may be effected by cuttings of half-ripened shoots, cut to a joint, dried at the base, and inserted in sand, under a glass.

P. andromedæfolia (Andromeda-leaved). A synonym of *P. phillyreoides.*

P. apetala (apetalous).* Victorian Hazel. *fl.* greenish, small, and very numerous, in loose, oblong, thyrsoid panicles, leafy at the base; calyx stellately hairy; petals none. June. *l.* petiolate, ovate-lanceolate or broadly oblong, obtuse or rarely acute, 2in. to 4in. long, irregularly crenulate, glabrous, but rough and much

Pomaderris—*continued.*

wrinkled on the upper side; principal veins very prominent beneath. *h.* 3ft. to 6ft. 1803. SYN. *P. aspera.*

P. aspera (rough). A synonym of *P. apetala.*

P. betulina (Birch-like).* *fl.* pale yellow, nearly sessile, in dense, globular heads, solitary or two or three together, on short, axillary or terminal peduncles; calyx densely hairy; petals none. *l.* oblong or obovate, obtuse, seldom above 1in. long. A slender shrub or small tree, with elongated branches. (B. M. 3212.)

P. discolor (two-coloured). A variety of *P. elliptica.*

P. elliptica (elliptic). *fl.* pale yellow; calyx white-tomentose; petals usually broadly cordate or nearly orbicular, concave, on slender claws, often narrower, occasionally abortive; cymes numerous, in dichotomous panicles. June. *l.* petiolate, ovate, oblong or ovate-lanceolate, obtuse or rarely acute, usually 2in. to 3in. long, entire or with margins slightly waved, white-tomentose beneath. *h.* 6ft. 1805. (B. M. 1510.) The variety *discolor* has the calyx tube less silky-hairy, and the leaves often less obtuse.

P. ericifolia (Heath-leaved). A synonym of *P. phylicifolia.*

P. lanigera (woolly). *fl.* pale yellow; calyx tube half as long as the lobes; petals ovate, concave, on slender claws; panicles often larger and less corymbose than in *P. elliptica.* April. *l.* oblong or ovate-lanceolate, the under side, as well as the young branches, clothed with soft, often rusty, tomentum. *h.* 3ft. 1806. (B. M. 1823.) SYN. *Ceanothus laniger* (A. B. R. 569).

P. ledifolia (Ledum-leaved). *fl.* pale yellow, few, in small, loose, shortly pedunculate cymes in the upper axils; calyx tube very short; petals narrow, slightly concave. April. *l.* narrow, oblong, obtuse, about ½in. long, entire, glabrous above, white beneath, the margins slightly recurved. *h.* 2ft. 1824.

P. phillyreoides (Phillyrea-like). *fl.* pale yellow, variable in size; cymes compact, in small, terminal panicles; calyx tube shorter than the lobes; petals similar to those of *P. elliptica,* but usually narrower. April. *l.* seldom 1½in. long, oblong or oval, obtuse or acute, entire, firm, glabrous or minutely hoary above, softly white or rusty-downy beneath. *h.* 2ft. 1818. SYN. *P. andromedæfolia* (B. M. 3219).

P. phylicifolia (Phylica-leaved). *fl.* pale yellow, small and few, in little, loose cymes in the upper axils, the upper ones forming thyrsoid, leafy panicles; petals none. April. *l.* narrow or linear-oblong, nearly sessile, seldom above ½in. long; margins much revolute; under surface white-tomentose, upper surface hairy; leaves sometimes broader, and nearly flat. *h.* 2ft. 1819. (L. B. C. 120.) SYN. *P. ericifolia.*

P. vaccinifolia (Whortleberry-leaved). *fl.* cream-colour; cymes small, in ovoid, terminal panicles of about 1in. in length; calyx tube very short; petals broad. *l.* ovate or nearly orbicular, very obtuse, seldom above ½in. long, glabrous above, white on the under surface. 1869.

POMARIA (named after Pomar, physician to Philip III. of Spain). ORD. *Leguminosæ.* A genus comprising five or six species of greenhouse, unarmed trees or shrubs, more or less black-dotted, mostly extra-tropical South American, and now included, by Bentham and Hooker, under *Cæsalpinia.* Calyx segments entire or at length loosely glandulose-fimbriate. Pods oblong or lanceolate, oblique or falcate, glandulose. Leaflets usually small, coriaceous. For culture of *P. glandulosa,* the only species introduced, *see* **Cæsalpinia.**

P. glandulosa (glandular). *fl.* yellow, disposed in axillary racemes; petals five, shortly unguiculate. May. *l.* abruptly bipinnate; stipules pinnatifid. *h.* 2ft. New Spain, 1826. The branches, calyx, and corolla, are glandular.

POMATOCALPA. A synonym of *Cleisostoma.*

POMAX (from *poma,* an operculum; referring to the operculum of the fruit). ORD. *Rubiaceæ.* A monotypic genus. The species is a small, greenhouse, branched, hirsute or glabrous under-shrub. It only differs from **Opercularia** (which *see* for culture) "in the simple flower-heads forming an umbel, instead of being united in a compound head" (Bentham).

P. hirta (hairy). A synonym of *P. umbellata.*

P. umbellata (umbelled). *fl.* greenish-white, disposed in a terminal, sessile umbel within the last leaves; corolla about ¼in. long. July. *l.* petiolate, ovate, elliptical, or lanceolate, mostly under ½in. long, or rather more when narrow. *h.* not more than 1ft. Australia, 1826. SYNS. *P. hirta, Opercularia umbellata.*

POMBALIA. Included under *Ionidium.*

POME. A fleshy, many-celled fruit, *e.g.,* an Apple.

POMEÆ. A tribe of *Rosaceæ.*

POMEGRANATE (*Punica Granatum*). A deciduous tree, which ranges from 15ft. to 20ft. in height, and has numerous, slender branches some being armed with sharp thorns. It is a native of Cabul and Persia, and is probably wild in North-west India; it is very commonly cultivated throughout the warmer regions of the globe. The fruit of the Pomegranate will be remembered in connection with Scripture history, where it is mentioned in conjunction with that of the Vine, Fig-tree, Olive, &c. The cultivation of the tree dates back, therefore, to remote antiquity: it is said to have been introduced to this country before 1600, and to have been cultivated by Gerarde. Although such an old occupant of our gardens, it is very seldom that fruits are ripened. The fruits "are generally about the size of the fist, and have a tough, leathery rind, of a beautiful deep golden colour, tinged with red, and are crowned with the remains of the calyx lobes" ("Treasury of Botany").

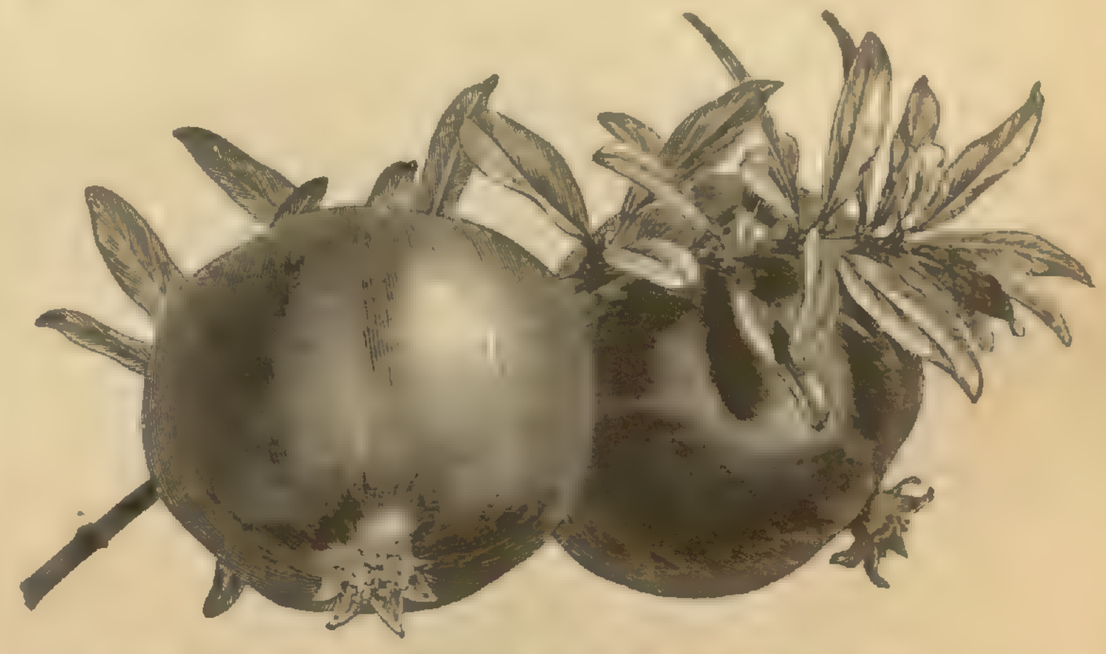

FIG. 249. FRUITING BRANCHLET OF POMEGRANATE.

See Fig. 249. As an ornamental tree, the Pomegranate is much prized in the South of Europe, and in many Eastern countries; but in Britain even its flowering is chiefly limited to the most exceptionally favoured localities. There is a double-flowered variety, and considerable variation of colour exists amongst those both with single and double flowers. The flowers are produced on the ends of branches made annually, sometimes singly, at others three or four together; generally, where they appear at all, a succession is kept up from about June until September. In inland and northern districts, the Pomegranate should be grown against a south wall, or in a tub or large pot in a greenhouse. A rich, loamy soil is that best suited to its requirements. Single varieties may be raised from seeds, and all varieties increased by cuttings, suckers, layers, or by grafting, using the common sort as a stock.

PONCELETIA. A synonym of **Sprengelia** (which *see*).

PONDWEED. *See* **Potamogeton.**

PONERA (from *poneros,* miserable; referring to the appearance of the species). SYN. *Nemaconia.* ORD. *Orchideæ.* A genus comprising six or seven species of stove, epiphytal orchids, natives of Central America and Mexico. Flowers rather small, axillary, in tufts upon the young leafy or the old leafless stems; sepals erect, fleshy, the lateral ones largest, and connate with the elongated foot of the column; petals free; lip naked, two-lobed, wedge-shaped, articulate with the foot of the column, which is short and terete; anther membranous, four-celled, containing four pollen masses, adhering in pairs by means of two powdery caudicles. Leaves alternate, in two rows, almost grass-like. The species introduced—*amethystina, graminifolia, Kienastii, leucantha, macroglossa, pleurostachys,* and *striata*—are all of botanical interest only.

PONGAMIA (*Pongam* is the Malabar name of *P. glabra*). SYN. *Galedupa*. ORD. *Leguminosæ*. A monotypic genus, the species being a stove, evergreen tree. For culture, *see* **Dalbergia.**

P. glabra (smooth). Kurrung or Poonga Oil-plant. *fl.* having a white corolla, and a red calyx, in loose, axillary racemes, 3in. to 5in. long. *l.* smooth, alternate, pinnate; leaflets five or seven, egg-shaped or broadly elliptical. *h.* 5ft. to 10ft. East Indies, North Australia, &c., 1699. From the seeds of this tree, an oil, called Kurunji, or Poonga Oil, is extracted in India, and greatly used for mixing with lamp oil, or, by the poorer classes, for burning without any admixture.

PONTEDERIA (named after J. Pontedera, 1688-1757, once Professor of Botany at Padua). Pickerel Weed. SYN. *Unisema*. ORD. *Pontederiaceæ*. A genus comprising seven or eight species of stove or hardy, aquatic plants, with stem-like or creeping rhizomes, all natives of North or South America. Flowers numerous, usually crowded at the sides of a rachis, scarcely pedicellate, the inflorescence terminal, compound, and densely cylindrical, rarely almost simple and racemiform; perianth funnel-shaped, with an incurved, slender or rarely abbreviated tube; stamens six. Radical leaves long-stalked, cauline ones short-stalked; all cordate, ovate, rotundate, or rarely lanceolate, with a long, loose sheath below the petiole. Stems (or branches) erect, simple, one-leaved. The best-known species is *P. cordata;* this is described as one of the handsomest hardy aquatic plants in cultivation. It is perfectly hardy, and should be planted in water from 6in. to 12in. in depth. Propagated by division, at almost any season.

P. angustifolia (narrow-leaved). A variety of *P. cordata.*

P. azurea (azure). A synonym of *Eichhornia crassipes.*

FIG. 250. UPPER PORTION OF PLANT OF PONTEDERIA CORDATA.

P. cordata (heart-shaped). *fl.* sky-blue, sometimes white, with a greenish spot on the inside of the upper lobe, in spikes, numerous, small. Summer and autumn. *l.* thick, on long stalks, lively green; petioles dilated, and sheathed at the base. *h.* 1½ft. to 2ft. North America, 1579. See Fig. 250. (B. M. 1156.) *P. angustifolia* is a variety with narrow-lanceolate leaves, cordate at the base, and also with smaller, bright blue flowers. SYN. *P. lanceolata* (L. B. C. 613).

Pontederia—*continued.*

P. dilatata (extended). A synonym of *Monochoria hastata.*

P. lanceolata (lance-shaped). A synonym of *P. cordata angustifolia.*

PONTEDERIACEÆ. A small natural order of erect or floating, aquatic herbs, mostly American, rare in tropical Asia and Africa, absent in Europe. Flowers hermaphrodite, scarcely irregular, or sometimes regular, fasciculate or scattered at the sides of a simple or branched rachis, racemose, spicate, or sub-paniculate, terminal, in a sessile or pedunculate sheath; perianth inferior, free of the ovary, the tube evolute or rarely absent; lobes (rarely segments) six, more or less distinctly biseriate; stamens six or three; filaments free; ovary three-celled. Perfect leaves on a rhizome or floating stem, long-stalked; blade floating or emersed; submersed leaves sometimes reduced to linear petioles (without a blade). *Pontederia vaginalis* is used in various forms as medicine in Japan. The order comprises four genera—*Eichhornia, Heteranthera, Monochoria,* and *Pontederia*—and scarcely thirty-five species.

PONTHIEVA (named in honour of M. de Ponthieu, a French West Indian merchant, who sent a number of plants to Sir Joseph Banks). ORD. *Orchideæ*. About ten species have been referred to this genus. They are curious, stove, terrestrial, glabrous or pilose orchids, with tufted roots, dispersed over the warmer parts of America, from Brazil as far as the Southern United States. Flowers mediocre, shortly pedicellate, disposed in loose, often glandular-pubescent racemes; sepals free, spreading; petals narrower, adnate to the column; lip posterior, adnate to the base of the column, the lamina abruptly dilated, spreading; column beaked; pollen masses bilobed; scapes elongated, simple. Leaves sub-radical, ovate or lanceolate, more or less stalked, membranous. The species known in gardens are described below. They thrive in a compost of sandy loam and peat, and require to be kept dry when at rest. Ample drainage must be provided.

P. glandulosa (glandular). *fl.* bright green, with the edges of the petals white; lateral sepals flat; dorsal one loosely agglutinate, with the petals in a rhomboid, tridentate lamina. *l.* cuneate-oblong, narrowed into a short petiole. Stem about 1ft. high. West Indies, &c., 1800. (B. M. 842, under name of *Neottia glandulosa.*)

P. maculata (spotted).* *fl.* widely spreading, ¾in. across; dorsal sepals pale brown, with darker streaks, ovate-lanceolate; lateral ones white, with brown spots, twice as large; petals yellow, with red-brown streaks, dimidiate-oval, parallel, clawed; scape stout, erect, bearing a loose, raceme-like spike. March. *l.* 1ft. long or less, sessile or narrowed into petioles, elliptic-lanceolate to narrowly oblong-lanceolate, acuminate, pale green. *h.* above 1ft. Columbia, &c. Whole plant covered with long, flaccid hairs. (B. M. 6637.)

P. petiolata (petioled). *fl.* yellowish-cinnamon in colour; lateral sepals with revolute margins; dorsal one forming, with the petals, an oblong, undivided lamina. *l.* ovate-oblong, shorter than the petioles, with crisped margins. Stem 1½ft. high. St. Vincent, 1822. (B. R. 760; L. B. C. 1190.)

PONTIA. A generic name employed, in some works, instead of *Pieris*, for the White Butterflies. *See* **Cabbage Caterpillars.**

POPCORN. A variety of *Zea Mays.*

POPE'S HEAD. A common name for *Melocactus communis.*

POPLAR. *See* **Populus.**

POPPY. *See* **Papaver.** The name is also applied to several members of other genera.

POPPY, CALIFORNIAN. *See* **Platystemon californicus.**

POPPY, CORN. *See* **Papaver Rhœas.**

POPPY, HORNED. *See* **Glaucium.**

POPPY-MALLOW. *See* **Callirhoe.**

POPPY, OPIUM. *See* **Papaver somniferum.**

POPULUS (the ancient Latin name = *palpulus*, akin to *palpitare*, to tremble; probably so called from its trembling leaves). Poplar. ORD. *Salicineæ*. A well-known genus of hardy, deciduous trees, with terete or angular branchlets, and having scaly buds, covered with resin; eighteen species have been described, natives of Europe, Central or mountainous and Northern Asia, and North America, including Mexico. Catkins loose, appearing before the leaves, the males often pendulous; flowers of both sexes usually shortly pedicellate, the females sometimes on an elongated pedicel, racemiform. Leaves alternate, sometimes on laterally compressed, tremulous petioles, usually broad, penniveined, and trinerved at the base, entire, toothed or lobed; stipules narrow, membranous, fugacious. Some of the Poplars are amongst the most rapid growers of all hardy forest-trees. They thrive under a variety of conditions as regards soil, &c., but do best in damp situations, such as along watercourses, &c. All are readily increased from cuttings, inserted in the open ground; soon after the leaves have fallen is the best time to do this. The weeping forms are generally grafted on tall, straight stems of the common upright-growing ones.

Fungi. Many kinds of Fungi live on dead branches and stems of Poplars, and a good many also on living parts; but the only one of the latter that is usually very noticeable in gardens is that known as *Exoascus aureus* (*Taphrina aurea*). This Fungus produces very conspicuous spots on the leaves of *Populus nigra*. These spots bulge on one surface, usually the upper, so as to appear almost hemispherical, and may be from ¼in. across up to a much larger size, when two or more fuse together. The spots are usually duller green above, bright golden-yellow below; but sometimes the yellow colour is on the upper surface. The microscope shows that the colour is due to a layer of rather long cells, fixed to the surface cells of the leaf by one end, but free in the rest of their length. Each is full of a large number of small, round cells or spores, which escape by bursting the wall of the containing cell. When abundant, this Fungus is very conspicuous from its colour, and is very hurtful to the young trees, which it chiefly affects.

The best remedy is the removal and destruction of the leaves, or of the branches, and even the whole trees if much infested, as soon as the Fungus appears. Perhaps the application of solutions of potassium sulphide or potassium permanganate might destroy the Fungus.

Insect Pests. Poplars are liable to the ravages of a considerable variety of insects, mostly beetles and moths. A number of them are described elsewhere, and these species are merely mentioned here, the reader being referred to the fuller information given under the headings quoted. The wood of the trunks is bored into by the Poplar

FIG. 251. POPLAR HORNET CLEARWING MOTH (*Sesia apiformis*).

Hornet Clearwing Moth (*Sesia apiformis*, see Fig. 251), the larvæ of which live for about two years in the trees. *See* **Sesia.** The larvæ of the **Goat Moth** (which *see*) are even more destructive. The young branches and the twigs are bored into by the larvæ of certain beetles

Populus—*continued.*

of the genus *Saperda*. The insects are rather slender, and nearly cylindrical, and of the general form shown in Fig. 252. *S. carcharias* is about ⅝in. to 1¼in. long, dusky-black, with grey or yellow pubescence, and rather long antennæ ringed with grey and black; the wing-cases are narrowed towards the tips. *S. populnea* is about ½in. long, black, slightly hairy, and marked with pits over the surface; the thorax bears three yellowish lines; the wing-cases are not narrower behind; they are covered with a yellowish pile, and bear three or four large, yellowish spots; the antennæ are ringed with ashy-grey and black. The larvæ of this species live in

FIG. 252. A, SAPERDA POPULNEA, natural size; B, BRANCH OF POPLAR, showing ravages committed by it.

gall-like swellings in the branches (see Fig. 252) of Poplars and of Willows. There are a few other species of *Saperda*, but they do not call for special mention. Branches tenanted by the larvæ (shown by their galled or withered state) should be cut off; this is usually sufficient to kill the larvæ, but it is well to have the branches burned.

The leaves are devoured by several beetles of the family *Chrysomelidæ*—the leaf-eating beetles *par excellence*. *Lina Populi* is frequently very abundant on Poplars. This beetle is nearly ½in. long, oval, and shining blue-black; the wing-cases red, except a black tip, and very finely pitted; feet, and tips of antennæ, black. The larvæ are shaped much like those of *Coccinella* (*see* **Ladybird**); the head, the hinder part of the body, and the legs, are black; the rest of the body is

Populus—*continued.*

pale, with rows of black, bristly warts. The larvæ, when touched, emit an ill-smelling, milky fluid. The pupæ are suspended from the leaves by the tail, and are coloured like the larvæ. The larvæ feed in groups on the leaves, gnawing them into holes, so that only the network of veins is left. *L. Tremulæ* is a nearly allied species common in some localities. It agrees with *L. Populi*, except in being slightly smaller and greenish-blue, with the wing-cases coarsely pitted, more yellowish-red, and not tipped with black; and the antennæ are tipped with brown. Another nearly allied insect, of similar habit, is *Phratora vitellinæ*. The same remedies may be employed against all the three species. *See* **Phratora.**

Numerous species of Sawflies (chiefly of the genus *Nematus*) feed, as larvæ, on Poplars, and most of these feed on Willows also; but none of them have been observed to do damage enough to require special measures to be taken against them. The same may be said of those *Lepidoptera* that feed, as larvæ, on the leaves of Poplars. If any remedy is required, hand-picking, or mere shaking them off the branches, is usually sufficient. Further information in regard to several of them is given under the following heads: **Lackey Moth, Liparis, Puss Moth, Sphingidæ** (Poplar Hawk Moth), and **Tussock Moths**; though, under several of these heads, Poplars are not specially mentioned in connection with the insects, which, in these instances, feed on many kinds of plants. In addition to these, a very large number of moths live on Poplars, but do not call for mention individually.

Poplars, including among them the Aspen, bear galls of various forms. Among the commonest of these are the hard, pea-like swellings on the leaf-stalks, formed by a midge (*Diplosis Tremulæ*); the rather conical, hollow galls on leaf-stalks, tenanted by Aphides (*Pemphigus bursarius*); the curious, spirally-twisted leaf-stalk galls of another kind of Aphides (*Pemphigus spirothecæ*); and the mite galls of Aspens, which vary in size from the galls of *Heliaczeus Populi* (about the size of pin-heads, at the base of the leaf-blade) to those of *Batoneus Populi*, which form masses, up to 3in. in diameter, on the young twigs or the trunk—fleshy, and green or red when fresh, but becoming hard, dry, and friable. These mite-galls are, in reality, the work of mites of the genus *Phytoptus* (*see* **Mites**), though the galls have received special names. Galls of all kinds do comparatively little harm to the trees, except rendering them unsightly. They should be cut off and destroyed, if it is desired to free the trees from them.

P. alba (white).* Abele; White Poplar. *fl.*, catkins 2in. to 4in. long, females shorter. March and April. *l.* on the branches 1in. to 3in. long, broadly ovate-cordate, sinuate-lobed, glabrous in age; petioles very short, slender, compressed; leaves on the suckers, which are numerous, deltoid-ovate, lobed and toothed, 2in. to 4in. in diameter. Branches spreading; buds cottony. *h.* 60ft. to 100ft. Northern hemisphere (Britain). The wood of this tree is white in colour, light, and useful, but does not burn easily. (Sy. En. B. 1299.)

P. a. Bolleana (Bolle's).* A remarkable form, of columnar or pyramidal habit, the counterpart (under *P. alba*) of the Lombardy Poplar. (G. C. n. s., xviii. 557.)

P. a. canescens (hoary). Grey Poplar. *l.* of the branches hoary beneath or glabrous; those of the suckers, angled and toothed. The wood of this variety is said to be superior to that of the type. See Fig. 253. (Sy. En. B. 1300.)

P. angulata (angular). A synonym of *P. monilifera.*

P. balsamifera (balsam-bearing).* Balm of Gilead; Balsam Poplar; Tacamahac. *l.* ovate, gradually tapering, and pointed, finely serrate, smooth on both sides, whitish, and reticulately veined beneath. Branches round; buds large, copiously varnished with fragrant resin. *h.* 70ft. North America, 1692.

P. b. candicans (whitish). *l.* broader, and more or less heart-shaped, pointed, serrate; petioles usually hairy. SYN. *P. macrophylla.*

P. b. laurifolia (Laurel-leaved). *l.* oval, oblong, and long-acuminate or lanceolate, sometimes sub-cordate, toothed; younger ones (and branches) slightly pilose. Siberia. SYN. *P. laurifolia.*

Populus—*continued.*

P. b. suaveolens (sweet-smelling). *l.* broadly elliptic, acuminate, obtuse, toothed, slightly pubescent on the nerves and petioles. Rocky Mountains.

P. b. viminalis (twiggy). *l.* long-lanceolate. Branches angular, elongated, slender.

P. canadensis (Canadian). A synonym of *P. monilifera.*

P. c. aurea (golden). A synonym of *P. monilifera aurea.*

P. dilatata (dilated). A synonym of *P. nigra pyramidalis.*

P. fastigiata (pyramidal). A synonym of *P. nigra pyramidalis.*

P. græca (Grecian). A synonym of *P. tremuloides.*

P. grandidentata (large-toothed). *fl.*, male catkins 3in. to 4in. long; females 1½in. to 2in. long. March. *l.* roundish-ovate, with large and irregular, sinuate teeth, when young 2in. to 3in. long, densely covered with white silky wool, at length smooth on both sides, 1in. to 3in. long. Branches and branchlets cylindrical; buds pubescent, sometimes slightly glabrous. *h.* 60ft. North America, 1772. (E. T. S. M. ed. ii. 278.) Of this species there is a weeping variety (*pendula*) in cultivation.

FIG. 253. PORTION OF BRANCH AND MALE CATKIN OF POPULUS ALBA CANESCENS.

P. heterophylla (variable-leaved). *fl.*, male catkins thick, 3in. to 4in. long, dense; females 2in. long, loose. March. *l.* 6in. to 12in. long, 4in. to 8in. broad, cordate or roundish-ovate, obtuse, serrate, white-woolly when young, at length nearly smooth, except on the elevated veins beneath. Branches round, pale; buds highly pubescent, thick, short, obtuse. *h.* 40ft. to 60ft. North America, 1765.

P. laurifolia (Laurel-leaved). A synonym of *P. balsamifera laurifolia.*

P. macrophylla (large-leaved), of Lindley. A synonym of *P. balsamifera candicans.*

P. monilifera (beaded).* Necklace Poplar. *l.* on young plants and suckers, heart-shaped, 7in. to 8in. long and wide; those on full-grown trees, only one-fourth that size, and commonly without the sinus; all crenate-serrate, or with obtuse, cartilaginous teeth. Branches acutely angular or winged. *h.* 80ft. or more. North America, 1738. SYNS. *P. angulata, P. canadensis.*

P. m. aurea (golden). A very useful, ornamental tree, only differing from the type in the decided golden-yellow tint of the leaves. SYN. *P. canadensis aurea.*

P. nigra (black).* Black Poplar. *fl.*, male catkins 2in. to 3in. long, cylindrical; females shorter, ascending, the peduncle curved in front. April. *l.* 1in. to 4in. long, rhombic, deltoid, or sub-orbicular, finely crenate-serrate, the angles rounded, acuminate; young ones silky beneath and ciliate; petioles slender, compressed. Branches greenish-white; branchlets pubescent when young, and, as well as the highly viscous buds, yellowish. *h.* 50ft. to 60ft. Europe, North Asia. The Black Poplar is of rapid growth and short duration; the wood is light, and is much used

Populus—*continued.*

for carving, charcoal-making, &c.; the bark is employed in tanning. (Sy. En. B. 1302.) For figure and dimensions of an enormous specimen of this tree, *see* G. C. n. s., xxi. 641.

P. n. pyramidalis (pyramidal).* Lombardy Poplar. Young leaves and branchlets glabrous. Habit pyramidal. SYNS. *P. dilatata*, *P. fastigiata*.

P. Simonii (Simon's). *l.* thick, sub-erect, 5in. to 6in. long, about 3in. broad, ovate-elliptic, equally attenuated at each end, dentate, crisped, intense green above, glaucous-white beneath. Branches elongated; bark reddish-brown. China, 1867. A tall tree.

P. tomentosa (tomentose). *l.* oval, 4in. to 5in. long, 2in. to 2½in. broad, usually cordate at base, very acutely toothed, intense green above, white-tomentose beneath. Young branchlets tomentose, adult ones glabrous; buds thick, conical, woolly-tomentose. China, 1867.

FIG. 254. BARREN BRANCHLET, AND ONE BEARING MALE CATKIN, OF POPULUS TREMULA.

P. Tremula (trembling).* Aspen. *fl.*, catkins 2in. to 3in. long, cylindric. March and April. *l.* 1in. to 4in. long; those of the shoots cordate, acute, entire, cottony beneath: those of the branches sub-orbicular-ovate, sinuate-serrate, with incurved teeth, glabrous or silky beneath; petioles very long, slender, glabrous; compressed branches spreading; buds pubescent, not viscid. *h.* 40ft. to 80ft. Arctic Europe (Britain), Africa, Asia. A well-known, erect tree, with white wood and grey bark. See Fig. 254. (Sy. En. B. 1307). The varieties *villosa* and *glabra* have respectively villous and more glabrous foliage than the type.

P. T. pendula (pendulous). A variety only differing from the type in its very pendulous branches. It makes a small, round-headed tree, and is best grafted on tall stems of the type.

P. tremuloides (Tremula-like). American Aspen. *l.* roundish-cordate, with a short, sharp point, and small, somewhat regular teeth, smooth on both sides, with downy margins; petioles long, slender, and laterally compressed. Adult branches glabrous; buds also glabrous, viscous. *h.* 20ft. to 50ft. North America. (E. T. S. M. 280, under name of *P. tremuliformis.*) SYN. *P. graca.*

PORANA (said to be the native name in the East Indies). SYNS. *Dinetus*, *Duperrya*. ORD. *Convolvulaceæ*. A genus comprising half-a-dozen species of stove or greenhouse, twining, slender, sometimes very high-climbing, annual herbs or shrubs, natives of the East Indies, the Malayan Archipelago, and Australia. Flowers frequently white, sometimes cymose or racemose at the apices of the branches, sometimes solitary in the axils; sepals subequal, stellato-patent; corolla campanulate or infundibuliform; limb plicate, of five broad, spreading lobes. Leaves sometimes cordate, many-nerved; sometimes ecordate, penniveined. The shrubby species are well adapted for training on rafters or pillars, in a stove, or in the warm part of a greenhouse. They thrive best in a compost of sandy loam and leaf mould, and are propagated by cuttings of stubby side shoots, which root readily in a compost similar to that just named. The annual species may be sown in heat, in early spring, and the seedlings either grown on in pots or planted out in the greenhouse or conservatory.

Porana—*continued.*

P. paniculata (panicled). *fl.* pure white, very small, tubularly campanulate; panicle large, much branched, leafy. August. *l.* cordate, acuminate, glabrous above and hoary beneath, 3in. long, 1½in. broad. Stem terete. East Indies, 1823. Plant shrubby, twining, clothed with hoary tomentum. SYN. *Dinetus paniculatus.*

P. racemosa (racemose).* *fl.* white, small; panicles loose-flowered, composed of racemes, leafy. July to November. *l.* cordate, acuminate, glabrous or downy, 3in. to 4in. long, with a wide recess at the base. Stem terete or angular. India, 1823. Annual. "This is the 'Snow-creeper' of the English, one of the most beautiful of Indian plants, the masses of dazzling white flowers resembling snow patches in the jungle" (C. B. Clarke). (S. B. F. G. 127.) SYN. *Dinetus racemosus.*

P. volubilis (twining). *fl.* white, small, numerous; panicles dense-flowered. July. *l.* cordate, acuminate, glabrous. Stem terete, glabrous, smooth or covered with white warts. East Indies, 1823. Plant shrubby.

PORANTHERA (from *poros*, a pore or opening, and *anthera*, an anther; the anthers open by pores). ORD. *Euphorbiaceæ*. A genus comprising five species of greenhouse, Australian herbs, annual or at length suffrutescent. Flowers white, monœcious, small, densely racemose, solitary in the axils of the bracts, pedicellate; females few, at the base of the capituliform racemes, which are solitary, or corymbose at the tips of the branches. Leaves alternate or rarely irregularly opposite, membranous, entire, small or narrow. *P. ericifolia*, the only species in cultivation, is a rather ornamental suffrutescent herb. It thrives in a peaty soil, and may be increased by seeds.

P. ericifolia (Heath-leaved). *fl.* numerous, the pedunculate racemes forming a dense, terminal, leafy corymb. July. *l.* crowded, sessile, linear, ¼in. to ½in. long, with revolute margins. Stem erect, 6in. to nearly 12in. high. 1824. (T. L. S. x. 22, p. 301.)

PORLIERIA (named after Andrew de Porlier, a Spanish patron of botany.) ORD. *Zygophylleæ*. A small genus (three species) of rigid, stove shrubs, with spreading, woody branches, natives of Texas, Mexico, the Peruvian Andes, Chili, and Parana. Flowers disposed in fasciculate, one-flowered peduncles; sepals four or five, rotundate, unequal, deciduous; petals four or five, unguiculate, imbricated. Leaves opposite, abruptly pinnate; leaflets almost opposite, entire, sensitive. The under-mentioned species (the only one introduced) thrives in a mixture of loam and peat. Propagation may be effected by ripened cuttings, inserted thinly in a pot of sand, and placed under a hand glass, in moderate heat.

P. hygrometrica (hygrometric). *fl.* green, white; calyx deeply four-parted; petals four, connivent. April. *l.* with seven or eight pairs of linear leaflets; these remain spread open during fair weather, but contract on the approach of rain. *h.* 2ft. Peru, 1820.

POROSTEMA. A synonym of **Nectandra** (which *see*).

PORPAX (of Lindley). Included under *Eria*.

PORPAX (of Salisbury). A synonym of *Aspidistra*.

PORPHYRA. A synonym of *Callicarpa*.

PORPHYREUS. Of a warm reddish-colour.

PORPHYROCOMA. Included under *Dianthera*.

PORRUM. Included under *Allium*.

PORTEA (named after Marius Porte, who first discovered the genus). Including *Ortgiesia*. ORD. *Bromeliaceæ*. A genus comprising three or four species of stove, American herbs, with short stems. Flowers beneath the upper bracts solitary, those under the lower

Portea—*continued.*

ones bi- or ternate; sepals ovate or ovate-lanceolate, scarcely imbricated; petals similar to those of *Billbergia*; peduncles terminal, with coloured scales; inflorescence in the typical species elongated. Leaves numerous, rosulate, elongated, rigid, spiny-serrate. The species require culture similar to **Billbergia** (which *see*).

P. kermesina (carmine).* *fl.* blue; spike erect, oblong, surrounded throughout by oblong-apiculate, rose-coloured bracts. *l.* tufted, spreading, ligulate, abruptly apiculate, channelled. *h.* 1½ft. Bahia, 1870. (R. G. 829; R. H. 1870, p. 239.) SYN. *Billbergia Brongniarti.*

P. Legrelliana (Legrell's). *fl.* spicate, with bright red sepals and bracts, and reddish-purple petals. *l.* lanceolate, recurved, 1ft. to 1¼ft. long, spiny. *h.* 6in. Brazil, 1875. SYNS. *Æchmea Legrelliana*, *Hohenbergia Legrelliana* (Ref. B. 285).

P. tillandsioides (Tillandsia-like). According to Bentham, this is the correct name of plant described in this work as *Æchmea Ortgiesii.*

PORTENSCHLAGIA. Included under *Elæodendron.*

PORTLANDIA (named in honour of a Duchess of Portland, who corresponded with J. J. Rousseau, and had some knowledge of English plants). ORD. *Rubiaceæ.* A genus comprising about eight species of handsome, very glabrous, shiny, stove shrubs and small trees, natives of the West Indies and Mexico. Flowers white or scarlet, large, often odorous, disposed on axillary, one to three-flowered, bracteate or ebracteate peduncles; calyx with an obovoid or campanulate tube, and a five-lobed, persistent limb; corolla large, sub-campanulate or clavate-infundibular, with a limb of five triangular, reduplicately valvate lobes. Leaves opposite, thickly coriaceous, petiolate, oblong or linear-oblong, with broad, intrapetiolar, deciduous stipules. Only three species have been introduced. These require a mixture of fibrous loam and leaf mould in equal parts, with the addition of a good quantity of sand; and plenty of heat and moisture are essential. Propagated by cuttings of rather firm shoots, inserted in sand, under a bell glass, and in a brisk, sweet bottom heat.

P. coccinea (scarlet). *fl.* scarlet, with yellow anthers, 3in. long, 2in. broad, axillary, pedicellate, solitary. *l.* ovate or elliptical-oblong, pointed, shining, 3in. long, 2in. broad. *h.* 2ft. to 3ft. Jamaica, 1812.

P. grandiflora (large-flowered). *fl.* white, reddish inside at the throat, 5in. long, 1½in. broad, very fragrant at night, axillary, solitary, pedicellate. June to August. *l.* elliptic or elliptic-oblong, pointed, shining. *h.* 10ft. to 14ft. West Indies, 1775. (B. M. 286.)

P. platantha (broad-flowered).* *fl.* pure white; tube 1in. long; the five-lobed limb nearly 4in. across. Summer. *l.* somewhat ovate or obovate, acute, deep shining green. *h.* 3ft. Native country unknown, 1849. (B. M. 4534.)

PORTUGAL LAUREL. *See* **Cerasus lusitanica.**

PORTUGAL QUINCE. *See* **Cydonia vulgaris lusitanica.**

PORTULACA (the old Latin name, used by Pliny, but by him spelt *Porcilaca*). Purslane. ORD. *Portulaceæ.* A genus comprising about sixteen species of stove, greenhouse, or hardy, annual or perennial, fleshy, diffuse or ascendent herbs, distributed over the whole world. Flowers purple, yellow, or pink; sepals two; petals four to six. Leaves alternate or irregularly opposite, flat or nearly cylindrical, often with tufts of bristles in their axils, and the upper ones forming an involucre around the flowers. The perennial species should be grown in a light position in a greenhouse, and potted in a mixture of loam, leaf mould, and coarse sand. The annual kinds may be raised from seeds, sown in boxes, and afterwards planted in a sunny border out of doors. All the species mentioned below, except the last, which is quite hardy, are best treated as half-hardy annuals.

P. foliosa (leafy). *fl.* yellow, about three; calyx hairy; petals retuse; involucre many-leaved. June. *l.* subulate. *h.* 6in. Guinea, 1822. (B. R. 793.)

Portulaca—*continued.*

P. Gilliesii (Gillies'). *fl.* red, purple, terminal, usually solitary. June and July. *l.* oblong, cylindrical, rather compressed, obtuse, dotted with axillary fascicles of hairs, erect, adpressed. Stems rather erect, branched at base. *h.* 6in. Mendoza, 1827. (B. M. 3064.)

FIG. 255. FLOWERING BRANCH OF PORTULACA GRANDIFLORA.

P. grandiflora (large-flowered).* Sun-plant. *fl.* yellow, purple, three or four together, terminal, crowded, surrounded by whorls of leaves and crowded hairs. June and July. *l.* scattered, cylindrical, acute, with pilose axils. *h.* 6in. Brazil, 1827. See Fig. 255. (B. M. 2885.)

P. g. Thellusonii (Thelluson's). *fl.* scarlet, large, terminal, sessile; petals two-lobed. Summer. *l.* sub-cylindrical, obtuse; floral ones sub-verticillate. Stem erect, thready in the axils. *h.* 1ft. 1839. SYN. *P. Thellusonii* (B. R. 1840, 31).

P. oleracea (culinary). Common Purslane. *fl.* yellow, solitary or clustered, stalkless above the last leaves on the branches. June and July. *l.* small, oblong, wedge-shaped, destitute of bristles in their axils. *h.* 6in. South Europe, 1582. The young shoots of this plant are sometimes put in salads, and the older ones used as a potherb, or for pickling. The species is generally cultivated in Holland, &c., for these purposes.

P. Thellusonii (Thelluson's). A synonym of *P. grandiflora Thellusonii.*

PORTULACARIA (so called from its resemblance to *Portulaca*). ORD. *Portulaceæ.* A monotypic genus, the species being a greenhouse, evergreen shrub, thriving in any dry, light soil. Propagated by young cuttings, taken off and dried for a few days, and then potted.

P. afra (African). Purslane-tree. *fl.* pink, small; peduncles opposite, denticulate, compressed; pedicels one-flowered. *l.* opposite, obovate, fleshy. *h.* 3ft. Africa, 1732.

PORTULACEÆ. A natural order of usually glabrous and more or less succulent, sometimes long-pilose, herbs, rarely small shrubs or under-shrubs, mostly American, some South African or Australian, a few Asiatic, North African, and European. Flowers regular, hermaphrodite, solitary at the tips of the branches, racemose, cymose, or paniculate, or the lower ones axillary or lateral; sepals fewer than the petals, commonly two, rarely five, free or adnate to the base of the ovary, closely imbricated, persistent or deciduous, herbaceous, scarious, or rigid; petals four or five, rarely many, hypogynous or rarely perigynous, connate, imbricated, entire; stamens inserted with the petals, free or in bundles, filaments filiform. Capsule membranous or crustaceous, rarely indehiscent. Leaves alternate or opposite, entire, often fleshy, sometimes stipulate. Several of the species are used as potherbs, and the herbage of *Portulaca oleracea* is eaten as a salad. *Claytonia tuberosa* has an edible root. Most of the plants comprised in this order are mucilaginous. *Portulaceæ* includes fifteen genera and about 125 species. Examples: *Calandrinia*, *Claytonia*, *Portulaca.*

POSOQUERIA (*Aymara posoqueri* is the name of *P. longiflora* in Guiana). SYNS. *Cyrtanthus* (of Schreber), *Kyrtanthus*, *Solena*, *Stannia.* ORD. *Rubiaceæ.* A genus consisting of about a dozen species of ornamental, very glabrous, stove shrubs, confined to tropical America. Flowers very sweet-scented, on ebracteate pedicels, disposed in terminal, many-flowered corymbs; calyx small, five-toothed; corolla white, pink, or scarlet, pendulous,

Posoqueria—*continued.*

with a terete tube sometimes more than 1ft. in length, a glabrous or villous, hardly dilated throat, and a five-parted limb; stamens five, a little exserted. Leaves opposite, on short petioles, coriaceous. For culture of the species described below, which are those best known in gardens, *see* **Gardenia.**

P. formosa (beautiful). *fl.* white, erect, very long, showy, sweetly scented; inflorescence terminal, cymose. July. *l.* opposite, oval, petiolate; stipules intrapetiolar, oblong-triangular, entire, at length deciduous. *h.* 15ft. to 20ft. Caraccas, 1815. (F. d. S. vi. 587.; L. & P. F. G. i. 114.)

P. fragrantissima (very fragrant).* *fl.* white, very fragrant, with a slender, cylindrical tube, 6in. long, and reflexed, elliptic-oblong segments, disposed in sub-corymbose panicles at the ends of the branches. *l.* opposite, ovate-oblong, coriaceous, shining green, the principal veins yellow. Branches yellow Brazil, 1871. A very handsome plant. (I. H. ser. iii. 27.)

P. gracilis (slender). *fl.* white, four or five in a corymb; corolla with a curved tube and an irregular limb. September. *l.* oval-lanceolate; stipules oblong. *h.* 5ft. to 6ft. Guiana, 1825.

P. longiflora (long-flowered). *fl.* white, with the tube 6in. long, very much incurved, nutant at the apex, green at the base; hairs in the throat very long; corymbs from six to twelve-flowered. Summer. *l.* oblong, acuminated, acute at the base. *h.* 5ft. to 6ft. French Guiana, 1820.

FIG. 256. FLOWERING TWIG OF POSOQUERIA MULTIFLORA.

P. multiflora (many-flowered).* *fl.* white, fragrant, with a slender tube 4in. long, and a spreading, star-shaped limb 2½in. across; cymes terminal. *l.* broad, oval-oblong, coriaceous, velvety, villous beneath. Brazil, 1866. A magnificent plant. See Fig. 256. (I. H. 597.)

P. revoluta (revolute). *fl.* white, disposed in dense corymbs; corolla with a straight tube, a villous throat, and an irregular limb. April. *l.* elliptic-ovate, each ending in a short, cuspidate point, and having revolute margins. *h.* 5ft. to 6ft. Brazil, 1852.

P. versicolor (various-coloured). *fl.* various-coloured, changing from white to crimson through pink, long, pendulous, fragrant; segments of corolla not much longer than the stamens. August. *l.* oval-lanceolate, acuminate at both ends, glabrous. *h.* 6ft. Cuba, 1840. A handsome shrub. (B. R. 1841, 26.)

POSTERIOR. Applied to that part of an axillary flower which is placed next the axis of inflorescence.

POSTICOUS. On the posterior side; an adnate anther is said to be Posticous when it faces the petals.

POTAMOGETON (from *potamos*, a river, and *geiton*, a neighbour; alluding to the natural place of growth). Pond Weed. ORD. *Naidaceæ.* A genus comprising about fifty species (with many sub-species and varieties) of aquatic herbs, with creeping rhizomes, widely distributed. They are of no horticultural value. Twenty-one species are natives of Britain.

POTASH. A compound of oxygen with a metallic element, first separated, in the pure state, by Sir Humphrey Davy, in the beginning of this century, and named by him potassium, in allusion to its preparation from Potash. The latter was itself long regarded as an element,

Potash—*continued.*

because of the difficulty of analysing it, and of separating the oxygen in it from the potassium. This latter is an essential element in the chemical composition of plants; as may be inferred from two facts, viz.: (1) it is always present in the ash that remains when well-dried plants are burned; and (2) plants grown in soils or fluids of known composition, from which potassium is entirely withheld, remain stunted. Among the chief commercial sources of potassium are wood-ashes. These are washed, and carbonate of potassium and various other substances are separated from them in this operation; the water in which they are dissolved is then heated until it is mostly driven off in the form of steam, and the less soluble substances can no longer be kept in solution, but fall to the bottom of the vessel. The carbonate of potassium remains dissolved after the other compounds have separated out. The solution is poured off, and, on being heated till all the water is driven off, the carbonate remains in a somewhat impure state, known as pearl-ash. From this are prepared, by appropriate chemical processes, the element potassium, and its various compounds. The ashes of leaves, and, in fact, of all parts of plants, yield a considerable proportion of pearl-ash; indeed, it is more abundant in the green parts than in the wood. It is plentiful also in seeds. Phosphate and chloride of potassium are also found in the ashes of plants. The compounds of potassium, taken together, amount very frequently to one-half, or even more, of the total weight of the ashes. Potassium probably exists in plants combined with organic acids, formed in the plants during growth, *e.g.*, as potassic tartrate, potassic oxalate, &c.; but these compounds are broken up when the dried plants are burned; and they are replaced in the ashes by the compounds already mentioned. Plants obtain the potassium that they require from the soil, which is seldom, if ever, wholly devoid of the element. Its exact uses to plants are still somewhat uncertain, as the results of experiments do not entirely agree among themselves; but there is little doubt in regard to certain conclusions, which are founded alike on analyses of ash of plants and on experiments. It has been found that plants from which potassium is entirely withheld cease to form new food for themselves, although supplied with every other element required for their nutrition. The tissues and organs of the plants remain healthy for a time; but they do not increase in size. On supplying a solution of any compound of potassium to them, they begin to grow again, and they continue to do so if the supply is kept up. It has been ascertained, by experiment, that the compounds of potassium most useful to plants are the chloride and nitrate; the phosphates and sulphates being less effective in promoting increase in size.

In reference to the mode of action of potassium on plants, its presence seems necessary to permit of *starch* being formed in the green tissues, by means of the chlorophyll. But, in addition to starch being formed in the green parts, it must be transferred from the tissues, where it is formed, to those in which it is to be made use of, or to be stored; and this seems to require the presence of chloride or of nitrate of potassium in the tissues. When the sulphate alone is supplied, the leaves become gorged with starch grains, and fleshy, and look sickly. The same result follows, though less markedly, when the phosphate is used instead of the sulphate.

POTATO (*Solanum tuberosum*). The product of this valuable and well-known plant may safely be designated, as an article of food, one of the most important and essential of any obtained from the vegetable kingdom; indeed, it would be difficult to imagine how the present population could, for any length of time, be adequately fed and provided for without it. The species from which

Potato—*continued.*

the extremely numerous varieties have originated is a native of South America, chiefly Chili and Peru, where it is found under variable conditions regarding soil and climate. The date of its introduction into Britain is a matter which has undergone much discussion, but the plant is generally believed to have been brought from Virginia to Ireland, in 1585 or 1586, by Thomas Herriott, who accompanied Sir Walter Raleigh in several voyages. The Potatoes introduced by Herriott were planted near Cork; but the value of the tubers for food does not appear to have been recognised for a very long period afterwards. In some French works, Parmentier is given the credit of having introduced the Potato, but his *rôle* in the matter was simply that of rendering its cultivation more popular. There are six tuber-bearing Solanums out of the total of 700 which Bentham and Hooker estimate as distinct species. Mr. Baker's investigations, however, in Sutton's trial grounds, led him to believe that "all the numerous varieties in cultivation had originated from *S. tuberosum*. . . . . As far as climate is concerned, it cannot be doubted that *S. Maglia* (or the Darwin Potato, as we might suitably christen it in English) would be better fitted to succeed in England and Ireland than *S. tuberosum*, a plant of a comparatively dry climate. We have indisputable testimony that *S. Maglia* and *S. Commersoni* yield readily an abundant supply of eatable potatoes. What I would suggest is, that these should be brought into the economic arena, and thoroughly tested as regards their economic value, both as distinct types, and when hybridised with the innumerable *tuberosum* forms." The following are the most important contributions to the history, &c., of the Potato: "A Review of the Tuber-bearing Species of *Solanum*," by J. G. Baker, F.R.S., F.L.S. in Linnean Society's Journal, Botany, Vol. XX.; "On the Cultivated Potato," by Earl Cathcart, in the "Journal of the Royal Agricultural Society of England," Vol. XX., s. s., Part I.; and "Nouvelles Recherches sur le Type Sauvage de la Pomme de Terre," by Alph. de Candolle, in the "Archives des Sciences Physiques et Naturelles," Tome XV. (Geneva, 1886).

Potato culture seems to owe its extension more to the industry and attention paid to it by the poorer classes of Irish inhabitants for the provision of food in a time of sheer necessity, than to the recommendations of professional men respecting a new source of food supply. In Scotland, a state of great destitution and famine prevailed about the middle of the eighteenth century, and this had the effect of calling general attention to agricultural subjects, and causing Potato cultivation to receive considerable impetus. It progressed rapidly afterwards, as farmers began to include Potatoes amongst their field crops, and the plant's requirements soon became better known, and new varieties began to be raised. About the middle of the seventeenth century, measures were taken by the Royal Society to encourage the general cultivation of Potatoes throughout the kingdom for preventing famine; but still their enormous value for food was only imperfectly recognised until about a century later, when attention was devoted to the subject which has since become of such vast importance. Potato crops received a serious check when the destructive disease (a full reference to which will be found subjoined) appeared amongst them. This has never been altogether eradicated, but much has been done, by way of raising new varieties, and growing only such as are, to a certain extent, disease-proof. Much also depends on the seasons being favourable or unfavourable to the development of the disease, regarding the crop that may be annually expected; but, notwithstanding these drawbacks, the Potato must still be regarded as one of the most valuable commodities for food supply, more especially in the British dominions. Besides the

Potato—*continued.*

value of Potatoes for this purpose, the constituent parts of the tubers may be turned to account in other ways, as, for instance, in making Potato starch, which is applicable for use as true arrowroot, and is often called English arrowroot. A powerful spirit is produced by distillation, and wine by a process of fermentation. The Potato may be cooked as a vegetable in an endless variety of ways, in all of which it is usually much esteemed.

PROPAGATION. This is effected by seeds or by cuttings of the stem, but chiefly by the planting of tubers, either whole or cut into pieces, each of which must contain at least one growing point, which is generally termed an eye. Potato seeds are only sown, as a rule, with a view to raising new varieties. This may be done in early spring, using pans of light soil, which should afterwards be placed in a little heat. The seedlings require pricking off before they become crowded; they may be transferred to a warm border, in the open, about the middle of May, and treated in a similar way to an ordinary crop. Only small tubers will be produced the first year; these, lifted in autumn, and preserved from frost, will bear others of larger growth the following season. Propagating from cuttings is not much practised, but is available for increasing the stock of any special variety. It consists in planting tubers in a little heat during early spring, and in inserting shoots as cuttings when they are about 3in. long. Tubers intended for planting are often termed "seed," to distinguish them from those required for other purposes. It is a matter of opinion whether they are injured by cutting into pieces, and also as to the suitability of large or small tubers for planting. Generally, it is not advisable to cut Kidney varieties, if they are of a medium size, and a sufficient quantity can be procured for planting. These have often a less number of eyes than Round ones, and, as the ends are pointed, the eyes are situated more closely together, and are not so readily divided. It has been found, from the mean product of two experiments, that cut tubers, used as sets, yielded a greater average than whole ones; but this is not to be accepted as a rule for general application. The advantage of large, or moderately large, sets over small ones, is obvious when we consider that the strength of the eyes and shoots which proceed therefrom is in proportion to the strength of the tuber. All the strongest eyes are situated on what may be called the top end of the tuber, and, when cutting is resorted to, it is a matter of importance to divide so that two, or at least one, of these prominent eyes are secured for each set. When the supply of Potatoes is very limited, both for culinary purposes and for planting, the tubers might be cut in half crossways, the upper portion being reserved as a set, and the other utilised for food. Potatoes intended for planting, particularly the early Kidney varieties, are considered much better for being exposed to the influence of light and sunshine in autumn until they become green throughout, and then stored in a dry shed through the winter. Early in the year, they may with advantage be set on end close together in shallow boxes, and allowed to start very gradually by keeping the boxes, in a light but cool place. The exclusion of frost is all that is requisite; artificial heat will have an injurious effect in encouraging the young shoots to grow fast and become weakened, instead of being short and vigorous. This preparation of sets for planting is requisite for frames, and for early crops outside, in order that the growth may be advanced beforehand, and their after-success so far insured: main crops inserted at a later and more favourable season seldom receive so much attention in advance.

It is generally admitted that an occasional change of sets is beneficial in cultivating Potatoes in any district. These should be procured from a different part of the

Potato—*continued.*

country, where the soil is also of a different description. The product of any given variety, for instance, may be of an indifferent quality in a heavy soil; transfer sets from this to another locality, where the conditions are altogether changed, and the results will, doubtless, be of a favourably marked description. In the changing of sets for planting, attention should therefore be directed to procuring them from a soil and neighbourhood where the surroundings are such as to effect a change as widely varied as may be practicable.

PLANTING AND GENERAL CULTIVATION. Potato planting is most extensively practised in spring, from February until towards the end of April, when the work should be completed for the year. Much depends on the locality and the state of the soil in different seasons; this latter would be found very variable at any given date, and the sets never start and grow evenly unless the soil is in a proper working condition at planting-time. From the beginning until the end of March, according as circumstances may permit, is the best period for inserting the main crops; those which are forwarded by being allowed to sprout first in a cool shed or room, must be reserved until towards the last, unless the situation in which they are placed is safely protected from frost. Autumn planting has been recommended, the tubers to be inserted deep in the soil; but this is now generally believed to be disadvantageous, and is seldom resorted to. Respecting the distance apart, both in rows and between the sets, much depends on the variety, the rich or poor nature of the soil, and the amount of exposure to light which the plants are afterwards likely to receive. For dwarf sorts, a distance of about 15in. between rows, and 9in. between sets, will be found ample; tall, strong-growing sorts, in good ground, will often cover all the space, if planted in rows from 2½ft. to 3ft. apart; but it is best not to allow more than about 8in. or 9in. between the sets, and these should be placed at a uniform depth of from 4in. to 6in. The sets are planted in various ways, but mostly in trenches cut with a spade, or in holes made with a dibber; in field culture, they are often placed in furrows made with a plough. Trenches are the best for garden crops; but the work by this system does not proceed so rapidly as it does when dibbers are used. A tolerably uniform depth may be secured by cutting a trench for each line as planting proceeds; the soil is left loose and open around the tubers, which is much preferable; and, when the whole is completed, all trampling on the newly-dug ground has been avoided. The use of a dibber affords a more expeditious mode of planting, and is extensively practised. When trenches are to be cut, a sufficient width of ground is prepared for each row; a line is then laid, and the ground cut out to the proper depth; this is filled in, after the sets are arranged in the bottom, and another space similarly prepared. By the other method of planting, holes are made next the line, with a dibber, at the proper distance apart. Another plan adopted with the dibber, is to use a strong one, about the length of a spade, and provided with a cross tread at about 6in. from the pointed end; this is chiefly practised in fields, or in large, open spaces, which have been prepared by ploughing or digging beforehand; a second person follows, and drops in the sets, and the holes may be filled in afterwards with a hoe. Amongst the chief objections to the use of dibbers, are those of treading the ground in making holes and planting, and the rendering of soil around the sets too compact by the necessary pressure; the sets are also invariably situated at unequal depths. Dibber-planting is less objectionable in light than in heavy or moist lands; but it may be noted that the last-named situations are not so preferable for the crop generally.

The subsequent culture consists chiefly in keeping the ground loose and free from weeds by lightly forking

Potato—*continued.*

or hoeing amongst the plants, and in earthing-up the soil in due course. The chief use of earthing-up is that of covering the tubers, which are, in reality, a sort of underground stems, and are formed on roots quite away from the set which was inserted. Where close planting is adopted, there is insufficient soil between rows to allow of a good ridge being drawn to each. Tubers also require covering to keep them from being exposed to light, which renders them unfit for food, although well adapted for planting. For this reason, therefore, the ridges should be made as wide on the top as possible, in order that the tubers may not protrude; by this arrangement, too, the top surface will be well situated for collecting rain water, and transmitting it to the roots, instead of allowing it to pass off. Earthing-up must be attended to so soon as the plants are sufficiently advanced; if delayed, the young tubers will have formed, and these will scarcely escape without injury.

Soil, Manure, &c. A good, friable loam, rather dry than otherwise, is that best suited for Potatoes. Wherever the land is naturally wet and heavy, or improperly drained, the quality of tubers is sure to be unfavourably affected. From rich garden ground, frequently and heavily manured, the quality is seldom so good as from a situation more exposed, such as an open field. In connection with many gardens, provision is made for growing the main crops on farm land, and limiting the garden to early supplies; where this is impracticable, late varieties should be relegated to the most open position at command, such as may often be selected inside a garden inclosure, yet outside the portion surrounded by walls. Dry and wet seasons have a material influence in connection with soils and the Potato crop; in heavy lands, the latter may be abundant and of good quality after a hot, dry summer; while in a wet one the plants will succumb very readily to the disease, and the tubers will be of a close, non-floury nature. On the other hand, a crop procured from soil comparatively light, will invariably be of good quality in any season, but will be less in quantity when the seasons are dry. Early varieties have, of necessity, to be grown in kitchen gardens, because of the requisite shelter being afforded, and borders where the soil is rather light and partially elevated afford the best position for meeting their requirements. A newly-turned-up soil is admirably adapted for a crop of Potatoes; much better, in fact, than when it has long been worked and highly manured. The tubers require a considerable quantity of moisture, but it must on no account be of a stagnant nature. In elevated land, for example, which has been devoted to grass, and then has been put under cultivation, the possibilities of stagnant water accumulating are remote, and the soil becomes naturally friable and open from aëration.

There are many manures which are in constant use for the Potato crop, and, unless the ground is fairly good in itself, one at least has to be used; but the produce is considered of better flavour, and less likely to suffer severely from the attacks of disease, where the application of manures is not necessarily of too frequent occurrence. The manure most commonly used is that obtained from a farmyard; it may be dug in equally all over the surface, or where the ground is very poor; the spreading of some in trenches, either beneath or above the sets, is the method more generally practised. One of the several manures which are mixed together in the farmyard is often the only one procurable by cultivators, especially cottagers, for their Potato crops. Of these, perhaps, pig-dung is most commonly met with; this should be well intermixed with the soil, or previously incorporated with a heap of refuse, &c., to be added as a compost for digging-in when planting. Partially-decayed leaf soil is an excellent ingredient for improving heavy land which has of necessity to be devoted to Potato culture, and so

Potato—*continued.*

are also burnt substances, such as wood and peat ashes, wood and peat charcoal, burnt clay, &c. Common salt is sometimes used beneficially as manure where the soil is unusually light and dry. Lime used occasionally for Potatoes has a marked effect, particularly on land already rich in decayed vegetable substances, the constituent parts of which require to be set free. Lime is also of use in killing slugs of various descriptions, which live in the earth, and frequently eat holes in, and partially destroy, the tubers. Guano, gypsum, bone-dust, nitrate of soda, and various other manures, have also been employed for the Potato, with more or less satisfactory results.

Digging and Storing the Crop. Before the destructive Potato disease made its appearance, the main crops could be allowed to ripen naturally, and their produce lifted for storing, in any suitable weather, and at any convenient opportunity, before the appearance of frost. Of late years, however, it has often been necessary to lift the successive crops, from the earliest onwards, so soon as the foliage indicates that the ripening process is approaching completion. After the appearance of disease in anything like an extensive form, the quicker lifting is commenced, the better, provided the produce is sufficiently matured to insure its keeping afterwards.

Exposure to light has a very injurious influence on Potatoes intended for food. It causes them to assume at first a yellowish tinge, and then a green colour, and materially impairs their flavour. The crop should, therefore, never be allowed to lie in the open air after being dug, except, perhaps, for an hour or two to dry; even this is unnecessary if the ground is in proper working order, and the weather fine; and from wherever the tubers are stored for the winter, or until required for use, light must be rigidly excluded. The most common plan of storing a stock of Potatoes is that of keeping them in pits; these, preferably, should never be made very large. A dry situation, or, at least, one where there is no possibility of water collecting, should be selected, and the soil dug out about 9in. deep, and 3ft. wide at the base. The Potatoes may then be piled up in a ridge as high as convenient, and covered with 9in. of soil, dug out from either side. The ridge, after being beaten flat with a spade, will be complete; it is then a good plan to thatch it with straw or dry fern, with a view to excluding frost and wet. It is advisable to make Potato pits with their ends pointing north and south. Thus arranged, a part of the contents may be taken out from the southern end, on a frosty day, without injury, when the sun shines, and the remainder made secure.

Culture in Pots, Frames, &c. An early supply of new Potatoes is always considered an essential in the kitchen garden, and various methods are adopted to secure it—first, from under glass; and next, from the most favoured positions outside which the garden affords. Pots 8in. in diameter are sufficiently large for one set each; they may be filled half full of soil at first, and top-dressed when the plants have grown. Potatoes grown under glass must not be subjected to much heat, nor must they be kept in a confined atmosphere. A light position in a frame, or on a shelf in a house where there is a little warmth, and plenty of air is admitted during favourable weather, is that best suited. Ordinary hotbeds in deep pits are well adapted for early Potato culture; to utilise all the space, the sets may be planted in rows 12in. or 15in. apart, and additional soil provided when earthing-up becomes requisite. Only dwarf, compact varieties should be grown under glass, and so soon as the weather allows, and after the plants are up, the sashes may be pulled off during the best part of the day, and put on again at other times. Potato plants are extremely tender. It is essential, in forwarding early crops, that protection from frost should always be secured. To succeed those grown under glass, other supplies should be brought on in warm,

Potato—*continued.*

sheltered spots outside, choosing the same dwarf varieties for the first, and protecting them with fern, dry litter, or other substance, should unfavourable weather occur.

FUNGI. By far the most destructive of the Fungi parasitic on Potatoes is that which causes "Potato Rot," and which is described under the heading **Phytophthora infestans** (which *see*). It is unnecessary to repeat what has already been said, and therefore the reader is referred to the above-named article for an account of this Fungus. The tubers suffer greatly from its action on them, though the action is less speedy than it is on the green parts of the plants. But even where the Fungus has not itself severely affected a tuber, the latter is rendered a suitable food for various species of Fungi which grow on it, and cause its decay by either Dry Rot or Wet Rot. The Fungi that grow on Potatoes under these conditions have been carefully studied by the German botanists, Reinke and Berthold; and they, in 1879, published an account of their researches ("Zersetzung der Kartoffel durch Pilze"). Of the many Fungi that they found on rotting Potatoes, they attribute the chief share to a few—viz.: in Dry Rot, to *Fusisporium* (*Hypomyces*) *Solani*, *Nectria Solani*, *Verticillium cinnabarinum*, *Chætomium crispatum*, and *C. bostrychodes*; and, in Wet Rot, to *Bacteria* (*Bacterium navicula* and *Baccillus amylobacter*), although the Fungi of the Dry Rot were also pre-

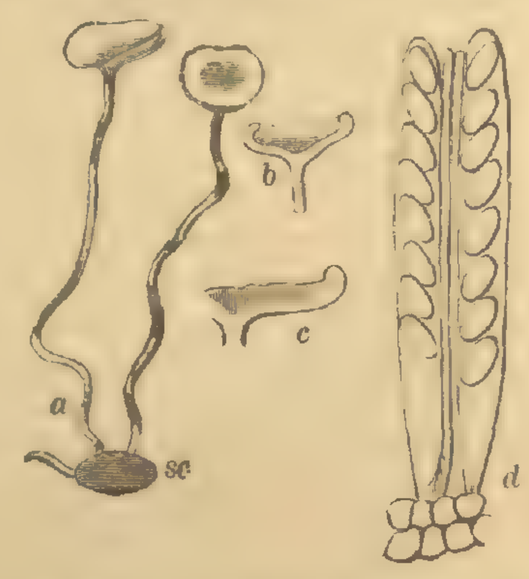

FIG. 257. PEZIZA POSTUMA—*a*, Small Specimen (natural size), with two Cups on slender stalks, which rise from an oval Sclerotium (*sc*); *b*, Cup, cut lengthwise; *c*, Section of Half of Cup, showing surface-layer of Asci; *d*, Two Asci, each with eight Spores, arising from small-celled Tissue of Cup (magnified about 250 times).

sent. They recommend exposure to air and heat, either of the sun or of artificial origin, to check the decay, by drying the substance, and to save as much of the starch as possible for conversion into dextrine, in which form it is now largely used. But other Fungi besides *Phytophthora infestans* attack growing Potatoes. One of the more dangerous of these is described in W. G. Smith's "Diseases of Field and Garden Crops" (pp. 15-29) under the name of *Peziza postuma*; but this Fungus is so like some others (*Peziza ciboroides*, *P. sclerotiorum*, &c.) that its specific rank is doubtful. Mr. Smith states that Potatoes in the West of Ireland were observed, in 1880, to suffer from a peculiar disease; but this was not fully traced to its cause in that year. It appeared at Stavanger, in Norway, in 1883, and also in the North of Scotland, where Mr. A. S. Wilson has grown the Fungus to maturity, *i.e.*, till the production of the *Peziza*. The diseased plants become covered with a dense coat of white mycelium; and, in a week or two from its first appearance, this kills the plants, withering up and drying the leaves. In the mycelium upon the stems there appear very many oval or rounded, hard masses, of all sizes up to ½in. across. They become black externally, but remain white inside. These bodies are sclerotia, and consist of very compact masses of mycelium, and the black coat is made up of small, angular cells, with dark, thickened walls, closely united in growth. The sclerotia pass the winter

Potato—*continued.*

unchanged, but the following summer there grow, from those lying on or under the soil, from one to three *Peziæ*, which have very long, slender, twisted stalks, each of which ends in a cup, which very soon becomes flat on top, and may reach ½in. across (see Fig. 257). The upper surface bears the very numerous asci standing side by side; each ascus incloses eight smooth, oval spores, which are ejected from it if the air is at all dry. If the spores fall on a suitable food-plant, they reproduce the Fungus.

All Potato haulms, and other rubbish, should be burned, instead of being left to infect the crop of next year. Deep ploughing or digging would bury the sclerotia too deep to allow the *Peziza* cups to reach the surface of the soil.

Potato Curl is a puzzling disease, since no evident cause could be detected by some observers, while Fungi have been discovered by others in the diseased plants. It was first observed in England in 1764, and soon afterwards was noticed in Rhenish-Germany and elsewhere. It has become less hurtful since 1820, or thereabouts. The young stems and leaves curve or curl up; the whole plant becomes sickly and stunted, and extremely brittle; the stems branch little, if at all; the leaves are small, and almost sessile; and the flowers and fruit often fall off prematurely, and all the green parts become mottled. Tubers are either not produced, or they are very small, and so watery as to be unfit for food. If used as seed potatoes, the disease usually, if not always, appears in the plants grown from them. Careful microscopic examination of the diseased plants has led to very different conclusions as to the cause, some observers (*e.g.*, Kühn) failing to detect any trace of Fungi, while others (*e.g.*, Hallier and Reinke) have found them in the interior of the diseased tissues. Hallier asserts, and Reinke agrees with him, that the disease is hereditary, or that diseased tubers produce diseased plants, and that these plants are not capable of forming tubers; that mycelium of Fungi is present in the inner tissues of the plants; and that infection with this mycelium will produce the same disease in previously healthy plants. Reinke and Berthold give the following account of the disease. The mycelium is present, they say, in the woody bundles of plants as soon as they begin to wither, and in badly-affected plants it may be traced throughout from the roots to tips of the leaf-stalks. It may also often be found in plants that show no outward sign of disease. If the plants are kept in a damp atmosphere, their whole surface becomes covered with a white coat of conidiophores, or spore-bearers, of Fungi, pushed out from the mycelium through the epidermis. These are, at first, colourless; and each bears two or three circles of short branches at the ends of the cells, which, in a single row, form the erect stem. There are from two to five branches in each circle, and one or more of them may bear one or two smaller branches. On the tip of each branchlet there grows a small, oval spore, which falls off on being wetted. They suggest for this Fungus the name of *Verticillium atro-album*. Mycelium was found in the tubers, even on plants that appeared moderately healthy.

In a second form of Potato Curl, the plants grow to full size, but then the edges of the leaves begin to curl backwards, and to become brown; and this extends to the whole of each leaf, and gradually back to the stems. Microscopic examination shows no Fungi in the leaves, or in the upper part of the stems; but underground the stems are marked with large, brown spots, and in the cortex of these spots the cells are traversed by mycelium, while the vessels show no trace of it. The roots also are brown and diseased, and the seed-tubers are often rotten. Cultivation of the Fungus showed it to be *V. atro-album*. At times, both forms of disease occur in the same plant. Tubers produced by plants

Potato—*continued.*

affected in either of the above ways are almost always diseased, and produce shoots that, from their first appearance, are evidently diseased. These shoots develop slowly, and remain small, stunted, and of an unhealthy colour. Dark spots appear on the leaves and on the leaf-stalks, and the leaves gradually wither from below upwards; and similar changes go on in the stems. The plants perish without being able to form new tubers. No Fungi have been detected in the leaves or stems of shoots produced by diseased tubers; but all the subterranean parts have the bark permeated by mycelium, though there is none visible in the woody bundles. The diseased tubers show an abundant mycelium in the corky layers of the skin. Cultivation of the mycelium, in each case, has yielded *V. atro-album*. Inoculation from diseased plants rendered previously healthy plants diseased; and healthy tubers planted in soil impregnated with conidia of *V. atro-album* produced diseased shoots. Reinke and Berthold suggest that *V. atro-album* may be an imperfectly-developed condition of some Pyrenomycetous Fungus of the genus *Nectria*, or closely allied to it, and oppose the view advocated by Hallier, that the cause of Potato Curl is *Pleospora polytricha*; nor do they think the disease is caused by any species closely allied to the genus *Pleospora*. Schenck, in a series of observations and cultivation of the diseased plants, obtained from some of them Fungi which were much like one form of conidia attributed to *Pleospora herbarum*, and which he called *Sporidesmium exitiosum* var. *Solani*. It is evident that there is need of further observations, since there may be more than one cause of this disease, and true parasites may be confounded with Fungi that grow only on tissues already dead. No cure is known; hence, prevention is the aim to be kept in view. Diseased plants should be pulled up and removed as soon as detected; and all the Potato-stalks should be collected into heaps and burned. Care should also be taken to prevent unsound tubers from being made use of as seed. In short, the means employed to limit the spread of Potato Rot, and of *Peziza postuma*, are equally applicable against Potato Curl.

In common with other herbaceous plants, the Potato affords, in its dead stems and leaves, an abundant food supply to many kinds of Micro-fungi; but, as none of these are known to be injurious to the plants during life, they do not require even to be enumerated here.

Potato tubers are rendered unsightly, at times, by the skin being more or less covered with brown patches or scabs. These may be due to various causes. In some cases, a microscopic examination shows that the scab is due to the growth of a Fungus, named *Tubercinia scabies*, the spores of which are formed of small cells, grouped into a globe around an air space. Each spore has a slender stalk at one side. There is often no trace of this Fungus at harvest-time; but, during the winter, it develops, and the spores form a layer beneath the skin, often extending over a great part of the tuber. After a time, the spores are set free by the bursting of the skin. In other forms of scale, the cells are filled with mycelium of Fungi, and the formation of the scab is probably due to the irritation caused by its presence in the tissues. In others, there is no trace of the action of Fungi; and it has been conjectured that the cracks, followed by scabbing, are due to contact with irritant or corrosive substances in the soil, and that the scabs are due to efforts at healing the injury; but new cracks form in them, and so the mischief goes on. The raw surfaces of the cracks render the tubers more liable to injury from Fungi, insects, frost, and other external causes. Scabbed Potatoes are diminished in value because of their unsightliness; but they do not seem unfitted for food when the skin is removed. They should not, however, be used as seed. When the cause

Potato—*continued.*

is in the soil, it should be either removed or counteracted. Potatoes should not be grown in soil known to give rise to scabbing.

INSECT PESTS. There are no insects, in the British Islands, absolutely confined to the Potato as their food; but several occasionally devour this, as well as other cultivated plants. To begin with those that eat the roots and tubers. Amongst the worst are the larvæ of several

FIG. 258. SKIPJACK, OR CLICK BEETLE—*a*, Line showing the natural length.

kinds of Skipjack Beetles (see Figs. 258 and 259), which bore holes in the tubers, to which they are very partial (*see* **Wireworms**). The larvæ of Cockchafers (*Melolontha vulgaris*) and Mole Crickets (*Gryllotalpa vulgaris*) also gnaw them, and the roots at times (*see* **Cockchafer** and **Mole Cricket**). The larvæ of certain *Noctuæ*, or Night Moths (*see* **Noctua** and **Turnip Moth**), are sometimes very destructive to the tubers, but do comparatively little harm to the other subterranean organs, since, as a rule, they do not feed at the season of growth of Potato-plants. Among the most harmful are the Heart-and-Dart Moth (*Agrotis exclamationis*), the Turnip Moth (*A. segetum*), and nearly-allied species. The larvæ of Crane Flies (*Tipula oleracea* and allies), commonly known as the Grub, or as Leather Jackets, because of the toughness of their skins (*see* **Crane Fly**), frequently injure the roots of growing Potatoes, and may also feed on the young tubers, though most destructive to grasses. Many kinds of small *Diptera* live, as larvæ, in decaying Potato tubers, and Curtis, in his "Farm Insects," has recorded ten species reared by himself from this food; but there is no evidence to show that they injure healthy tubers. Millipedes, including *Polydesmus complanatus*, and one or two species of *Julus* (*see* **Millipedes** and **Myriapoda**), are often found feeding in the tubers, but they hardly seem to bore into them if quite healthy, and, in general, appear to take advantage of holes scooped out by the larvæ already mentioned, or to bore into tubers which are softened by disease. Centipedes also (*see* **Myriapoda**) are often found in holes in the tubers, but they are all

FIG. 259. WIREWORM, OR LARVA OF SKIPJACK BEETLE.

carnivorous, and probably assist in reducing the number of destructive larvæ. Last of the animals that destroy the tubers, must be mentioned the various kinds of Slugs, which eat large holes in them, and continue to feed in these till, occasionally, there is little left of the smaller tubers (*see* **Slugs**). Slugs do not seem to do much harm to the green parts of Potato-plants.

The green stems and the leaves are not, as a rule, liable to severe insect attacks with us, though in North

Potato—*continued.*

America they suffer much damage from this cause. The more injurious of these American insects will be here briefly referred to after mention has been made of such as have been observed in Britain.

Curtis records finding a beetle (*Macrocnema exoleta*), allied to the Turnip Flea, feeding on the leaves of Potatoes, and still more abundantly on the Bitter-sweet *Solanum Dulcamara*). The beetle has the head black, the thorax deep ochreous, the elytra pale ochreous, except a pitchy line down the suture, and the limbs pale. It is from $\frac{1}{11}$in. to $\frac{1}{8}$in. long. These pests can scarcely be ranked as a serious danger to the Potato crop, but, should they become dangerous to it, they may be reduced in numbers by the same methods as are employed against the **Turnip Flea** (which *see*).

Of moths, few live, in the larval state, on Potato leaves; but one species is almost restricted to this plant—the Death's Head Hawk Moth (*Acherontia Atropos*). This moth (see Fig. 260) is one of the largest and handsomest of our native species. The appearance, form, and markings, are shown in the woodcut; but the spread of wings may be 5in. The fore wings

FIG. 260. DEATH'S HEAD HAWK MOTH.

are a fine brown, with darker and paler markings, and a conspicuous yellow dot in the centre. The hind wings are orange-yellow, with two dark bands. The body is yellow and brown, with six black cross bands on the abdomen, and a row of six bluish spots down the middle of the back. The thorax bears, between the fore wings, a large mark, like a skull, or "Death's head," whence the popular name. Because of this mark, also, the insect is much dreaded, in various parts of Europe, by superstitious rustics and others, as ill-omened; and this impression is deepened by the power (very rare among moths) of emitting a sharp squeak when handled. The larva and pupa can also emit peculiar sounds. The larva feeds now chiefly on Potatoes; though it has also been found on the Jasmine, the Deadly Nightshade (*Atropa Belladonna*), and the Tea-tree (*Lycium barbarum*). It reaches a very large size, tapering a little towards the head, but ending abruptly behind, where it bears a small horn, very rough, yellowish, and bent downwards, but turned up at the tip. The creature is smooth, and is usually pale yellow on the back, and green near the head and along the lower part of the sides. There are seven oblique, violet or

Potato—*continued.*

blue stripes, on each side, each pair of which meet on the back. The body is sprinkled with minute, black dots. A variety sometimes occurs of a brownish-olive, with the stripes darker. The larvæ feed only by night, hiding in the soil by day. Their large size renders them somewhat destructive; though they are never so common as to endanger the crop. When full-fed, they crawl under ground, and there each forms an earthen cell. In this it turns into a large pupa of a red-brown colour. Some of the moths may emerge in the late autumn, and hybernate; but most do not appear till spring. Should it be necessary to reduce the numbers of larvæ, they must be sought for at night, by lantern light, on the ravaged plants; their large size renders them conspicuous. The pupæ are frequently turned up in the fields during Potato harvest.

Several species of *Hemiptera*, or Plant-bugs (*see* **Insects**), have been recorded by Curtis, in "Farm Insects," as living on Potatoes, boring into the tissues with their long, sharp beaks; and, by sucking the sap from the green organs where abundant, they greatly weaken the plants. Several of them belong to the group *Hemiptera Heteroptera*, in which the fore wings have the basal half leathery, and the other half membranous. Curtis mentions several, as found by himself, feeding on the Potato crop, all of them belonging to the genus *Lygus*. These insects are green or ochreous, passing into rosy, and are about ¼in. long. He also describes two species of Frog Hoppers, which belong to the group of *Homoptera*, which have the wings of uniform texture (*see* **Frog Hopper**). These are also about ¼in. long. One of these (*Eupteryx picta*) is yellow with black spots, and brown clouded markings on the front wings. The other he names *E. Solani*, as a new species (G. C. vi. 388), and describes it as lively green, with the tips of the fore wings rusty-brown. The name is noticed in the latest list of British *Homoptera* as a synonym of *Chlorita viridula*, Fall.

Remedies. These *Hemiptera* undoubtedly do harm when very numerous. Probably, the most effective means of reducing their numbers would be to sweep the rows of Potatoes, every now and then, with a large insect net, removing and destroying the insects caught. Applications to the plants are scarcely required, though Paris Green, applied as recommended for the **Potato Beetle**, would be effective.

Aphides do so little harm that it is scarcely necessary to refer to them. The only species noted by Buckton, in "British Aphides," as feeding on Potatoes, is *A. urticaria*. Two or three others have also been recorded from the Continent.

The insects most hurtful to Potato-plants in the United States of America, and in Canada, are beetles, most of them belonging to the group of Blister Beetles, of the genus *Lytta*. Five species of this genus have been observed to feed on the leaves and stems, but only as beetles. There seems little reason to fear injury from them on this side of the Atlantic, since their habits do not favour the chances of their being accidentally imported. The same holds good of the Three-lined Leaf Beetle (*Lema trilineata*), one of the *Chrysomelidæ*, which lives, as larva and as beetle, on Potatoes; the larva shelters itself under a coating of its excrements. The famous Colorado Beetle (*Doryphora decemlineata*) requires a longer notice, and this will be found under the heading **Potato Beetle.** Still another American beetle that injures Potato crops is the Potato-stalk Weevil (*Baridius trinotatus*), which does harm only while in the larval state. The larva bores into the stems near the base, and eats downwards towards the root, killing the plants. It is white, and legless. The beetle is a dark, long-snouted Weevil, about ⅛in. long. It does not seem likely to be transported over seas to us; nor does there

Potato—*continued.*

seem reason to fear the introduction of the other American insects that injure Potatoes.

SORTS. Varieties of Potatoes are exceedingly numerous, and new additions are annually made. It is requisite to have a selection of early, second early, and late ones, for maintaining the supply throughout the year. Some few sorts are grown in immense quantities because of their generally good flavour and cropping qualities under varied circumstances; others—a far larger proportion—are grown for private consumption, on a more limited scale, in gardens, and also by persons who exhibit collections at shows. Soil and locality have an important bearing on the quality and productiveness of different varieties of Potatoes, and the effect on each can only be properly learned by experience. A few good sorts known to succeed should always be depended upon, and new ones tried at first in small quantities, until their respective merits are ascertained. The extent to which any sort will withstand disease, especially in an unfavourable season, is now a material consideration when judging of its suitability for extended cultivation. Subjoined is a limited selection of sorts which are amongst those most approved.

Kidney-Shaped. ASHLEAF, MYATT'S PROLIFIC, a well-known, prolific sort, which follows the old variety in season. ASHLEAF, OLD, a very old variety, but still one of the best for early supplies. ASHLEAF, VEITCH'S IMPROVED EARLY, a very heavy cropper, of handsome appearance, excellent quality, fine flavour, and a first-rate forcer; quite distinct. BEAUTY OF HEBRON, a heavy cropper, and early; tubers very handsome, smooth in texture, and slightly tinged with pink around the eye; fine for exhibition. COSMOPOLITAN, an excellent early white variety, of fine form, very productive, and of superior table quality. COVENT GARDEN PERFECTION, a second early white variety, of medium size and very handsome shape; a heavy cropper, and remarkably free from disease; fine for exhibition. EARLY DWARF-TOP, very small top, early, and fine for forcing. EARLY ROSE, a first early, American variety, of great productiveness. INTERNATIONAL KIDNEY, very handsome in shape; one of the finest exhibition Kidneys LAPSTONE, a well-known and good sort, of fine shape, and excellent quality. MAGNUM BONUM, a late, heavy cropper, of robust growth, and very free from disease. MISS FOWLER, a handsome late, white variety, seedling from WOODSTOCK KIDNEY, but much more prolific, and a thorough disease-resister; top growth strong and robust; a very heavy cropper; tubers of moderate size, very even, and of finest table quality. PRINCE ARTHUR, one of the best main crop Potatoes; a heavy cropper and excellent keeper; the flesh is white, and, when boiled, very floury, and of first-class quality. WELFORD PARK KIDNEY, tubers large, of first-rate table quality, very smooth, with clear, white skin; one of the finest varieties for exhibition or table use. WOODSTOCK KIDNEY, a very handsome variety, of beautiful shape, with very level eyes and rather rough skin; a good cropper, white and mealy when cooked; fine for exhibition. WORMLEIGHTON SEEDLING, excellent for table use; a great cropper and good keeper. YORKSHIRE HERO, a variety of unusual excellence; one of the finest of the LAPSTONE section; smooth, handsome tubers of highest quality, and a long keeper.

Round. BEAUTY OF KENT, a very handsome, second early variety; the tubers are flattish-oval in shape, and of a rich rosy-pink colour, and keep good till March; a fine variety for exhibition. BEDFONT PROLIFIC, a second early sort, very heavy cropper, of the finest quality, and a handsome exhibition variety. BLANCHARD, a fine, large variety, of handsome shape, with clear, white skin, beautifully streaked with purple; very desirable for exhibition purposes. DALMAHOY, a second early variety, of excellent quality; one of the best for general use. DUNBAR REGENT, a well-known, good late sort, very productive. EARLY COLDSTREAM, a remarkably early and prolific variety, of beautiful shape, and very white and floury; fine for forcing. EARLY REGENT, early, productive, and of good flavour. GRAMPIAN, a handsome and distinct, early variety; skin pinkish-white, flaked with rich rosy-pink round the eyes; an abundant cropper. M.P., a really excellent white variety, with rather deep eyes; seedling from PATERSON'S VICTORIA, of dwarf, stout growth, the crop remarkable for quantity and evenness, of most excellent size, and the quality all that can be desired; it is a second early, but requires time to ripen for the table. PATERSON'S VICTORIA, an excellent sort for general use, large, and very productive. PORTER'S EXCELSIOR, a remarkably handsome variety, superb for exhibition. RADSTOCK BEAUTY, tubers singularly handsome, and of fine quality; a robust grower and heavy cropper. READING HERO, a heavy cropper, of excellent quality, and very free from disease. READING RUSSET, a heavy cropping, second early variety, of good quality. RED EMPEROR, OR MAIN CROP, skin clear light red, very handsome tubers; fine for exhibition. SCHOOLMASTER, a very superior main crop variety; tubers large, round, of regular

Potato—*continued.*

form, with small eyes; flesh white and floury when cooked; an abundant cropper, very handsome, fine for exhibition, and excellent for general use. SCOTCH CHAMPION, a good main crop variety, a heavy cropper, and very free from disease. VICAR OF LALEHAM, a very fine and distinct variety, seedling from VICTORIA; the tubers are purple, round, and of very handsome shape, with beautiful white flesh, of first-rate table quality, and fine for exhibition purposes.

POTATO BEETLE (*Doryphora decemlineata*). This insect, also often called the Colorado Beetle, though not yet a resident in the British Islands, is among the best known of insects, by name, at least, to most persons in the United Kingdom, thanks to the scare that arose with regard to it a few years ago. It was first observed in the Rocky Mountains of America, in the Colorado region, feeding on a wild species of *Solanum*, the genus to which the Potato belongs. When Potatoes were planted by settlers in the beetle's native home, it attacked the new food-plant, throve on it only too well, and commenced to spread rapidly eastward; and in 1876 it reached the Atlantic coast. It is now common along the Eastern States, and in Canada, and it is not impossible that it will be conveyed to, and may be able to establish itself in, our own islands. It has proved able to withstand heat and cold, dry and moist climates; and would pro-

FIG. 261. POTATO BEETLE (*Doryphora decemlineata*), natural size.

bably find our climate suit it. In its passage eastward in America, it committed great havoc in the Potato-fields, and excited fears in the minds of many, lest it should continue, year by year, to inflict severe injury to the Potato crop, and lest it might effect a footing in Britain, as appeared very probable. To guard against this latter risk, the Privy Council of Great Britain and Ireland passed an Order, which was published in the "London Gazette" of August 17th, 1877, to the effect that "If the owner of, or any person having the charge

FIG. 262. POTATO BEETLE (*Doryphora decemlineata*), enlarged. The left wing-case has been removed to show the wing.

of, any crop of Potatoes, or any vegetable, or substance, finds, or knows to be found, thereon the Colorado Beetle, in any stage of existence, he shall, with all practicable speed, give notice of the same to a Constable of the Police establishment of the locality; . . . . . and it is further provided that it shall not be lawful for any person to sell, keep, or distribute living specimens of the Colorado Beetle in any stage; and any person failing to do anything he is by this Order required to do, is, for each offence, liable to a penalty not exceeding ten pounds."

An idea of the general form, size, are markings of the

Potato Beetle—*continued.*

beetle may be obtained from Figs. 261 and 262, and of the larva from Fig. 263. The colours of the beetle are as follows: It is usually straw-yellow above, though, at times, the head and thorax are tawny-yellow, with black spots on them, as shown. The wing-cases each bear five equidistant, black bands, the second and third of which, counting from the middle, frequently meet behind. The legs are tawny-yellow, with black knees and tarsi, and (in, at least, the last pair) black thighs; the antennæ are yellow in their basal part, black in the rest of their

FIG. 263. LARVA OF POTATO BEETLE (*Doryphora decemlineata*), natural size.

length. The larva (see Fig. 263) is pale yellow, or, rather, dusky-yellow, or freckled with minute black dots on the back; and there are *two* rows of larger black dots along each side; the legs are black. The females place their eggs in small clusters on the lower surface of the

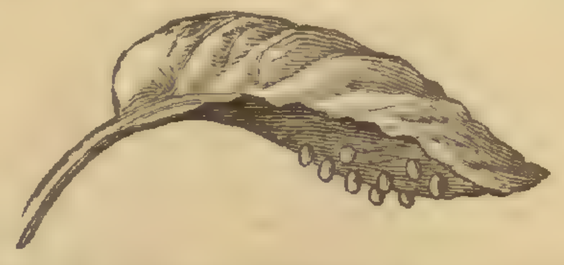

FIG. 264. EGGS OF POTATO BEETLE ON A LEAF, natural size.

Potato leaves (see Fig. 264). The eggs are oval, smooth, bright yellow, and glossy. In five or six days, the larvæ appear, and in from two to three weeks they are full-fed, and creep under ground, to become pupæ. In about a fortnight, the beetles emerge, and the females proceed to egg-laying. In America, three broods are produced each year, the third brood hybernating under ground, or in any suitable retreat. Both larvæ and beetles feed on the leaves of Potatoes, and soon leave nothing but the mere ribs, utterly destroying the crop.

In June, 1877, the insect was found at Mühlheim, on the Rhine, and in three places at Schildau, in Prussian Saxony; but it was stamped out by the energetic action of the Prussian Government. Occasional living examples have been found in British seaports, but they have never appeared in this country on the Potato crops. In America, and in Germany, it has been observed that, when they have exhausted the Potato-plants, they resort to low weeds, *e.g.*, Goosefoot, Knotgrass, Hedge Mustard, and even to Cabbage.

Remedies. In America, the use of Paris Green, or Scheele's Green (hydrocupric arsenite), sold at about 6d. per lb., is found effectual in saving the crop of Potatoes. It may be dusted on the plants, but it is better to mix it with water, in the strength of a tablespoonful to a bucket of water, and to sprinkle them with this. Caution must be used in handling this substance, as it is a dangerous poison. Hand-picking would probably be sufficient to get rid of the insects on their first appearance in a new

Potato Beetle—*continued.*

locality, at a distance from other habitats, as must be the case in their appearance anywhere in Europe.

For other Beetles destructive to Potatoes, *see* remarks on INSECTS under **Potato.**

POTATO ONION. A variety of Onion, cultivated in much the same way as Shallots. Single bulbs may be planted in January, or as early in spring as weather permits, in rows about 12in. apart, a distance of 6in. being allowed in the rows. The produce is useful for an early supply. Increased only by tubers.

POTATO, SPANISH or **SWEET.** A common name applied to **Batatas edulis** (which *see*).

POTENTILLA (a kind of diminutive from *potens*, powerful; alluding to the reputed medicinal power, of which these plants really possess very little, being merely mild astringents, like the rest of the tribe). Cinquefoil. Including *Comarum*, *Horkelia*, *Sibbaldia*, and *Tormentilla*. ORD. *Rosaceæ*. A large genus of glabrous, pilose, or silky-tomentose, mostly hardy sub-shrubs or herbs, rarely annuals. According to the authors of the "Genera Plantarum," the species number about 120, although upwards of 220 have been accorded specific rank by various authors. They are natives of the temperate and frigid regions of the Northern hemisphere, rarely occurring in the tropics; only two species have been found in the Southern hemisphere. Flowers white or yellow, very rarely red or purple, often disposed in corymbose cymes, rarely axillary and solitary; calyx persistent, with a concave, hemispherical, or urceolate tube, and five (rarely four) erect or spreading, triangular-ovate, valvate lobes; petals five (rarely four), obovate, orbiculate, or linear-spathulate; stamens usually numerous. Leaves alternate, or the floral ones opposite, digitately three to seven-foliolate or impari-pinnate; leaflets solitary, or bi- or ternate, often lobed or divided; stipules adnate to the base of the petioles. Several species of this genus are very desirable subjects for rockwork, bare banks, and similar situations; they thrive in almost any moderately good garden soil, but a sandy one is preferable. Potentillas may be readily propagated by division, or by seeds. Some of the hybrid forms are of far more importance to horticulturists than the typical species. The undermentioned are hardy herbaceous perennials, except where otherwise specified.

P. alba (white). *fl.* white, with a dark orange ring at the base, nearly 1in. across; petals obcordate, longer than the calyx; pedicels axillary and terminal. February to August. *l.*, lower ones quinate, upper ones ternate. Stems procumbent, weak. European Alps, &c.

P. alpestris (mountain). *fl.* bright yellow, about 1in. across, with cordate petals and acute sepals; pedicels axillary and terminal, long. July. *l.*, radical ones of five, rarely of seven, wedge-shaped, rather hairy leaflets, deeply cut in the upper half. Stems ascending. *h.* 6in. to 12in. Europe, &c. (Britain). (Sy. En. B. 429.)

P. ambigua (doubtful).* *fl.* rich yellow, about 1in. across, and just overtopping the dense carpet of foliage. June. *l.* green, forming a dwarf, dense mass. *h.* 6in. Himalaya, 1851. A creeping plant, of free growth. (B. M. 4613.)

P. arguta (sharply-serrated). *fl.* pale yellow, in a crowded, dichotomous panicle; petals obovate, entire, longer than the calyx. June and July. *l.* pinnate; leaflets roundish-ovate, oblique at base, doubly and deeply toothed. Stem erect, pubescent. *h.* 1ft. to 3ft. North America, 1826. (B. R. 1379.)

P. argyrophylla (silvery-leaved).* *fl.* yellow, ¾in. to 1¼in. in diameter; petals obcordate-cuneate; calyx silky. Summer. *l.*, leaflets sessile or slightly stalked, green, finely silky above, white beneath; teeth acute. *h.* 1½ft. to 3ft. Himalaya. SYN. *P. insignis* (B. R. 1841, 37).

P. a. atrosanguinea (dark blood-coloured). *fl.* of a beautiful dark crimson. Himalaya, 1822. SYN. *P. atrosanguinea* (L. B. C. 786; B. M. 2689).

Potentilla—*continued.*

P. atrosanguinea (dark red). A synonym of *P. argyrophylla atrosanguinea.*

P. Clusiana (Clusius'). *fl.* in terminal corymbs; corolla white, large; petals roundish, hardly longer than the calyx. June to August. *l.*, radical ones quinate, cauline ones ternate; leaflets oval-cuneiform, pubescent, tridentate at apex, with connivent teeth. *h.* 6in. Eastern Europe, &c., 1806. (B. M. 1327; J. F. A. 116.)

P. Comarum (Comarum). Marsh Cinquefoil or Potentil. This is the correct name of the plant described in this work as *Comarum palustre.*

P. congesta (crowded).* *fl.* crowded, terminal; corolla white; petals longer than the calyx; outer calyx segments quite entire. August. *l.*, radical ones pinnate; leaflets cuneate-oblong, cut at the apex. *h.* 1ft. to 2ft. California, 1826. (B. M. 2880, under name of *Horkelia congesta.*)

P. formosa (beautiful). A synonym of *P. nepalensis.*

FIG. 265. POTENTILLA FRUTICOSA, showing Flowering Branch, detached Flower, with Petals removed, and Carpel.

P. fruticosa (shrubby).* *fl.* yellow, sub-corymbose, numerous, small, with obovate-roundish petals, longer than the calyx. Summer. *l.* pinnate; leaflets oblong-lanceolate, quite entire, hairy. *h.* 2ft. to 4ft. Northern hemisphere (Britain). Shrub. See Fig. 265. (Sy. En. B. 436.)

P. gracilis (slender). *fl.* golden-yellow; petals obcordate, longer than the silky calyx. July. *l.* quinate, lower ones on long petioles, upper ones sessile; leaflets lanceolate, deeply and pinnatifidly serrated, white-tomentose beneath. Stem hairy, corymbosely panicled at apex. *h.* 1ft. to 2ft. North America, 1826. (B. M. 2984.)

P. grandiflora (large-flowered). *fl.* yellow, large; petals obcordate, twice the length of the calyx; receptacle pilose. June and July. *l.* ternate; leaflets obovate, cuneate at base, deeply serrated, pilose. South Europe, 1640. Plant ascending. (B. M. 75.)

P. Hopwoodiana (Hopwood's).* *fl.*, petals beautifully variegated, marked with a spot of deep rose-colour at the base, and from it to the centre of a pale straw-colour, edged with bright rose-colour. June and July. *l.*, lower ones with five or six leaflets, upper ones ternate; leaflets oblong-cuneiform, coarsely toothed, hairy on both surfaces. *h.* 1½ft. A hybrid. (B. R. 1337; S. B. F. G. ser. ii. 61.)

P. insignis (remarkable). A synonym of *P. argyrophylla.*

P. laciniosa (jagged-leaved). *fl.* yellow, disposed in corymbose panicles; petals obcordate, much longer than the calyx. June and July. *l.* with five to seven oblong, laciniately-pinnatifid, pilose leaflets. Stem erect, reddish. *h.* 1ft. to 1½ft. Hungary, 1816. A sub-species of *P. recta.* (B. R. 1478.)

P. lupinoides (Lupine-like). A synonym of *P. nivalis.*

Potentilla—*continued.*

P. minima (smallest). *fl.* yellow; calyx segments shorter than the corolla. May and June. *l.* ternate, smoothish above, but pilose beneath; leaflets obovate, short, crenated, and rather retuse. *h.* 3in. Alps, 1818. (L. B. C. 480.)

P. missourica (Missouri). A synonym of *P. pennsylvanica.*

P. nepalensis (Nepaul). This species is very like *P. argyrophylla atrosanguinea*, but has quinate, radical leaves. Himalaya. SYN. *P. formosa* (S. B. F. G. 136).

P. nitida (shining).* *fl.* of a delicate rose, the green sepals showing between the petals, the petals nearly oval in outline, notched at the apex, longer than the calyx; solitary. Summer. *l.* ternate; leaflets obovate or wedge-shaped, toothed at the apex, clothed on both sides with shining, silvery, silky down. Stems ascending. South Europe, 1815. (Gn., June, 1884; J. F. A. 25; R. G. 858.)

P. nivalis (snowy). *fl.* three to six, terminal; corolla white; petals obcordate, shorter than the calyx. July. *l.* with five to seven obovate, roundish, obtuse leaflets, which are connivently serrated at the apex, and densely clothed with silky hairs. Stem erect, pilose. *h.* 3in. to 6in. Pyrenees, 1739. SYN. *P. lupinoides* (L. B. C. 654).

P. nivea (snowy-leaved). *fl.* yellow; petals broad, obcordate, a little longer than the calyx. June to August. *l.* ternate; leaflets obovate-cuneiform, with flat, deeply serrated margins, rather hairy above, but clothed with white tomentum beneath. Europe, &c., 1815. Plant ascending. (L. B. C. 460.)

P. n. macrophylla (large-leaved). A variety with larger flowers and leaflets, and elongated petioles. (B. M. 2982.)

P. pennsylvanica (Pennsylvanian). *fl.* yellow, corymbose; petals emarginate, longer than the woolly calyx. June to August. *l.* pinnate, with usually three pairs of leaflets, hoary and silky above, white-downy beneath; leaflets oblong, pinnatifid, with linear-lanceolate, acute segments. *h.* 1½ft. North America, 1827. SYN. *P. missourica* (B. R. 1412).

P. pyrenaica (Pyrenean). *fl.* deep golden-yellow, large, the petals very round, and overlapping, and twice as long as the calyx. Summer. *l.*, radical ones on long stalks, velvety or nearly smooth, with oblong leaflets, toothed towards the end; cauline ones three to five-lobed, on short stalks, and the upper ones entire. *h.* 8in. to 16in. Eastern and Central Pyrenees. A showy species, sometimes covered with adpressed hairs, and at others quite smooth.

P. Russelliana (Russell's). *fl.* of a rich blood-scarlet, nearly 2in. in diameter; petals obcordate. Summer and autumn. *l.* ternate, one-coloured beneath. *h.* 1ft. Hardy. A hybrid, probably between *P. argyrophylla atrosanguinea* and *P. nepalensis.* (B. M. 3470.)

P. Saxifraga (Saxifrage-like).* *fl.* white, in corymbose, subumbellate heads; petals nearly round, twice as long as the calyx. May and June. *l.* either of five leaflets, the central leaflets having short, partial petioles, and all being three-toothed, with connivent teeth, or of three leaflets, which are generally entire. Stem shrubby, with very short, densely-tufted branches. *h.* 4in. to 6in. Mentone. (F. M. x.)

P. Sibbaldia (Sibbaldia). *fl.* yellow, few, in terminal, close cymes; petals small. July. *l.* 1in. to 3in. long; leaflets ⅛in. to 1in. long. Stems 3in. to 5in. long, axillary, ascending, leafy. Europe (Britain), North America. (Sy. En. B. 426.) SYN. *Sibbaldia procumbens.*

P. Tormentilla (Tormentilla). Blood-root. *fl.* bright yellow, small, and mostly with four petals; the first one of each stem has, however, frequently five. Summer. *l.*, lower ones shortly stalked; upper ones always sessile, with three, or rarely five, leaflets. Stems erect. Europe, &c. (Britain). (B. M. Pl. 101; Sy. En. B. 430.) SYN. *P. tridentata.*

P. tridentata (three-toothed). A synonym of *P. Tormentilla.*

P. unguiculata (clawed).* *fl.* pearly-white, ½in. in diameter, in open panicles with slender, spreading branches, peduncles, and pedicels; petals rather longer than the calyx lobes, rounded. July. *l.*, radical ones 4in. to 8in. long, petioled, narrow-linear, flexuous, sessile, consisting of three closely-packed leaflets; cauline ones more sessile, with more scattered leaflets. Stem 9in. to 12in. high, very slender. California. (B. M. 6560.) SYN. *Ivesia unguiculata.*

P. verna (spring). *fl.* bright yellow, in irregular panicles at the ends of the stems, with obcordate petals longer than the calyx. Spring. *l.* rigid; lower ones on long stalks, with five or seven, oblong or wedge-shaped, toothed leaflets; upper ones quinate or rarely ternate, nearly sessile. *h.* 6in. to 8in., but sometimes prostrate. Europe, &c. (Britain). A variable species. (Sy. En. B. 428.)

P. viscosa (clammy). *fl.* yellow, crowded at the tips of the branches into a few-flowered panicle; petals obovate, emarginate, hardly longer than the calyx. June to August. *l.* greenish on both surfaces, pinnate; leaflets oblong, sharply and deeply serrated, upper ones decurrent, lower ones small. *h.* 1ft. to 1½ft. Dahuria, 1797. (B. R. 1492.)

POTENTIL, MARSH. *See* **Potentilla Comarum.**

POTERIUM (the old Greek name, used by Dioscorides, from *poterion*, a drinking-cup; the foliage of Burnet having been used in the preparation of some medicinal drink).

Poterium—*continued.*

Burnet. Including *Sanguisorba.* ORD. *Rosaceæ.* A genus comprising about fifteen or twenty species of greenhouse or hardy, perennial (in one case annual) herbs, decumbent at base, very rarely spiny shrubs, inhabiting the whole of the temperate and warmer regions of the Northern hemisphere. Flowers at the tips of the scapes, densely capitate or spicate, small, bracteate and bibracteolate; calyx tube turbinate, persistent, constricted at throat; lobes four, petal-like, deciduous, imbricated; petals absent. Leaves alternate, impari-pinnate; petioles elongated, with an imbricated sheath at base; leaflets petiolulate, serrated, rarely entire. The herbaceous kinds thrive in any ordinary garden soil, and may be increased by seeds. The shrubs require a light, rich soil, and may be propagated by young cuttings, which will root readily under a glass. *See also* **Burnet.**

P. caudatum (tailed). *fl.* greenish, dicœcious, sometimes six-cleft and trigynous; spikes elongated, cylindrical. January to April. *l.*, under surface, as well as the petioles and peduncles, villous. Branches unarmed. *h.* 2ft. to 3ft. Canary Islands, 1779. Greenhouse shrub. (B. M. 2341.)

P. officinale (officinal). Great Burnet. *fl.* dark purple; spikes ovate; stamens equalling the glabrous calyx. June to August. *l.* glabrous; leaflets ovate, rather cordate. *h.* 3ft. to 4ft. Europe (Britain). Perennial herb. SYN. *Sanguisorba officinalis* (Sy. En. B. 421).

P. Sanguisorba (Sanguisorba). Common Salad Burnet. *fl.* greenish or purplish; lower ones of the head male, upper ones female. June and July. *l.*, as well as the stems, glabrous; leaflets roundish-ovate. *h.* 1ft. to 2ft. Europe (Britain). Perennial herb. (Sy. En. B. 419.)

P. spinosum (spiny). *fl.* greenish, in oblong spikes. April to August. *l.*, leaflets smoothish, serrated. Branches rather villous, the ultimate ones terminating in spines. *h.* 2ft. to 3ft. South Europe, 1595. Hardy shrub. (S. F. G. 943.)

FIG. 266. LARVÆ OF POTHERB MOTH.

POTHERB MOTHS. Under this name are included numerous species of *Noctuidæ*, the larvæ of which devour the low-growing garden produce or potherbs, such as Cabbages, Turnips, Beets, Peas, Beans, Carrots, &c. The moths are nearly all dull-coloured, and mostly have a spread of wings of 1¼in. to 2¼in. They belong to groups for the most part already discussed (*see* **Mamestra,**

Potherb Moths—*continued.*

Noctua, Plusia); hence, it is unnecessary to repeat here what is to be found under these headings, as to the form and habits of the moths. The larvæ are long and worm-like (see Fig. 266), not hairy, and generally dull green, brown, or yellowish in colour, with longitudinal lines and black dots, though sometimes ornamented with brighter colours. They live hidden between the leaves of their food-plants, or underground upon roots of Turnips and other plants, and, unless looked for, are very seldom to be seen. Owing to their mode of life, they are apt to remain in Cabbages and other vegetables till cooked and sent to the table. It is hardly possible to get rid of them entirely, and the more so, since most of them feed largely on weeds, as well as on garden produce. *Hadena oleracea* sometimes gets the

FIG. 267. HADENA OLERACEA.

name of Potherb Moth, though not peculiarly destructive. For its appearance, see Fig. 267. The front wings are reddish-brown; there is a nearly white line parallel to the hind margin, and bent so as form a W nearly in the middle; the stigmas near the middle of the wing are margined with white scales, and the one nearer the tip (the reniform stigma) is of a dull ochreous colour. The hind wings are grey-brown, paler towards the

FIG 268. LARVA OF HADENA OLERACEA.

base, and the body is grey-brown. The larva (see Fig. 268) is usually some shade of dull greenish-grey, with many white dots, and a smaller number of regularly-arranged black dots along the body. The back is marked with three dull, darker lines lengthwise, and there is a white line running along the lower part of each side. The pupa is protected in an earthen cocoon.

Remedies. The larvæ of all kinds of Potherb Moths should be destroyed whenever seen. Hand-picking, though slow, is, perhaps, the surest method. Gas-lime is a very useful application, either used fresh in a narrow ring on the soil, round, but not touching, the stems of the plants, or after some months' exposure to air, when it should be dusted over the plants, so as to allow it to get between the leaves. Soot has also been successfully employed. Of course, such remedies render it necessary to thoroughly wash the plants before using them at table. The pupæ are often exposed when the soil is dug over in garden-

Potherb Moths—*continued.*

ing operations, and they should be destroyed. The moths may be attracted by light, or by "sugaring," and should be caught and killed.

Potherbs are also frequently damaged by hairy larvæ. Some account of these will be found under **Tiger Moths** (which *see*).

POTHOMORPHE. Included under *Piper.*

POTHOS (the Cingalese name of one of the species; the *Pothos* of Theophrastus is an entirely different plant). ORD. *Aroideæ* (*Araceæ*). Of this genus, about forty species have been enumerated, but, according to the "Genera Plantarum," not more than twenty are really distinct. They are much-branched, tall, stove, climbing shrubs, with the lower branchlets rooting, and those at the summit spreading, and inhabit Asia, Australia, the Pacific Islands, and (one species) Madagascar. Spathe small, ovate or conchoid, rarely elongated, reflexed, green, accrescent or persistent; spadix shorter than the spathe, long-stipitate, clavate, globose, or ovoid, often decurved, sometimes twisted or flexuous, clothed with perfect flowers, each of which has a perianth of six segments, fornicate at apex; peduncles leafy, sheathed, or naked. Leaves distichous, obliquely linear or ovate-lanceolate, the blade sometimes deficient; petioles winged or widened, and leafy. The species described below are the only ones worth growing, the others being more curious than ornamental. For culture, *see* **Anthurium.**

P. acaulis (stemless). A garden synonym of *Anthurium Hookeri.*

P. argyræa (silvery). A garden synonym of *Scindapsus argyræa.*

P. aurea (golden). *l.* strikingly variegated, of a dark green, boldly and irregularly marked by bands or fantastic-shaped blotches of creamy-yellow, here and there suffused with pale yellowish-green, cordate, ovate, acute, thick, fleshy. Solomon Isles, 1880. A very distinct and remarkable plant, of free growth; "probably some species of *Scindapsus* or *Raphidophora*" (N. E. Brown). (I. H. 387.)

aureus
Pothos, fide
Index Kew.
is masculine

P. cannæfolia (Canna-leaved). A synonym of *Spathiphyllum cannæfolium.*

P. celatocaulis (concealed-stemmed).* *l.* oblique, sessile, with a short, clasping sheath, broadly elliptic in outline, very obtuse at apex, and cordate at base, rich dark green; under surface pale green, and minutely crystalline. North-west Borneo, 1880. A handsome climber, lying perfectly flat upon the surface over which it climbs; it is a most desirable plant for covering walls, trunks of tree-ferns, &c. As the flowers of the plant are unknown, it is far from certain that it belongs to the genus *Pothos.* (F. d. S. 2419-20; I. H. n. s., 496.)

P. fœtidus (fetid). A synonym of *Symplocarpus fœtidus.*

P. Seemanni (Seemann's). *fl.*, spathe ovate or ovate-oblong, apiculate; spadix slightly longer than the stipes; peduncles short. May. *l.* lanceolate, acute, obtuse at base; petioles more or less cuneate, auriculate-rotundate, shorter than the blade. China, 1821. (B. R. 1337, under name of *P. scandens.*)

POTS AND POTTING. Pots are amongst the most essential of garden utensils, and on the proper execution of Potting depends materially the success attained in plant culture. Potting is a general term meant to imply that a plant is being first placed in a Pot, or transferred from one size to another for providing additional rooting space. Pots are generally made of clay, and as this varies in different localities, so do the articles made from it; from different potteries, too, the sizes and shapes vary considerably. In making Pots, a certain quantity of clay is called a "cast"; this is worked to make the number by which the sizes are in many places distinguished—thus, 48's, 32's, 24's, &c.—the two lesser numbers taking respectively the same quantity of clay to the cast as the other, but the Pots being in two larger sizes. In other places, the sizes are known by inches, as 5in., 6in., 8in., and so on. All Pots are made, or should be made, wider at the top than at the bottom; this is an essential provision for allowing the balls to be turned out without becoming broken. If the shape were cylindrical, or the bottom wider than the top, this would be an impossibility, as the ball becomes compressed inside to the same shape, and, in due course, is usually permeated

Pots and Potting—*continued.*

with roots. In order to supply plants with an amount of soil and root space somewhat in proportion to their several requirements, numerous sizes of Pots are indispensable. There are various sorts and shapes made, the most being of the ordinary description; while special ones are made for Orchids, and for other purposes, such as forcing Rhubarb and Seakale. Ordinary Pots are always provided with a hole at the bottom, for the escape of water; in some of the larger sizes, two or three in addition are made at the side, near the bottom. A rim is generally made round the top, but, in some potteries, small sizes are made without; one of the objects being that a larger quantity may be stood in a given space after they are filled with plants—the absence of rims allowing them to be arranged in a smaller compass. Orchid-pots are of greater width, in proportion to depth, than others of ordinary make; they are also much perforated at the bottom and sides, to insure the porosity and perfect drainage which these plants require, and to allow spaces for their roots to grow through and attach themselves to the outside surface. Blanching-pots used for forcing Rhubarb and Seakale are large and deep, and are provided with a movable top, for affording access to the interior without lifting off the whole. They are inverted over the plants in the reserve ground, or elsewhere in the open garden, and covered with leaves or fermenting material. These Pots are specially useful where forcing or forwarding is only requisite in spring, and not throughout the winter.

Some few cultivators favour glazed Pots in preference to those of the usual description, which are unglazed; but they are much higher priced, and, for several reasons, are not to be generally recommended. Glazed Pots do not need much attention to keep them clean, and plants grown in them require less water than in the others; but there is not the same degree of cohesion between the soil and Pot, which is most desirable for success in plant culture.

Besides the sorts of Pots already referred to, there are others known as the Alpine or Double-sided, and the Double-rimmed. The Alpine Pot is virtually two, one inside the other, a narrow space being allowed between them for filling with water, damp sand, or moss, for the purpose of preventing evaporation from the soil in which the plant grows. This end may be gained, to a certain extent, by the use of moss and two ordinary Pots of different sizes, one inside the other; but, if water is intended for filling the space between, only the best ware, as used for the Alpine Pot, would suit: the ordinary sort would be too porous. Double-rimmed Pots are used for propagating, when bell glasses are employed; an extra rim being made for the reception of the glass, which admits of all the space inside being occupied with cuttings. These Pots have few practical advantages, and are not extensively used. Shallow Pots are now in great demand, especially for Orchids: they may be suspended like baskets, and, being shallow, are often called pans.

Potting forms a most important part of the routine work of gardening; it has to be practised more or less almost daily in all extensive establishments. The work varies infinitely with the numerous subjects grown, as do also the requirements of different plants. Some need very firm, and others only moderately firm, Potting; and, again, one sort of plant will bear frequent, and what is termed large, shifts, while certain death would result with another were it similarly treated. A few general remarks may be given on this subject here; but it will be unnecessary to enter far into details, since these are given elsewhere under the several plants which specially require them, and the practice is one which can only be fully learned by long experience and close observation. The provision of proper and efficient drainage is always of great importance, and forms the first part of the Potting

Pots and Potting—*continued.*

process, except the preparation of soil and Pots. These latter should always be used clean and dry; they are best if washed; but when this is impracticable, a thorough rubbing-out is most essential. It may not be generally known that plants never turn out properly from Pots that are wet or dirty at the time they are used; sometimes, it is impossible to separate balls of earth without breaking them all to pieces, and so destroying, or at least injuring, the roots. Dry, clean Pots, and good drainage, are, therefore, important preparations for Potting. The proper soil will, of course, vary with the numerous plants about to be inserted therein, but a rule of general application is that of having it just sufficiently moist at the time of using. Wet soil cannot be properly worked in around the roots, and plants never succeed so well when placed in it; while a soil too dry cannot be rightly solidified in Potting, and is difficult to moisten through afterwards by watering. Soft-wooded plants may invariably have more soil added to their roots at one time than those of a hard-wooded nature: where Pots nearly as large again may be safely used with the one, the other would only require the least additional space. Spring is the season when Potting operations are naturally most active, as the period when new growth commences in so many plants, after comparative inactivity, is a good time to provide them with additional root-space

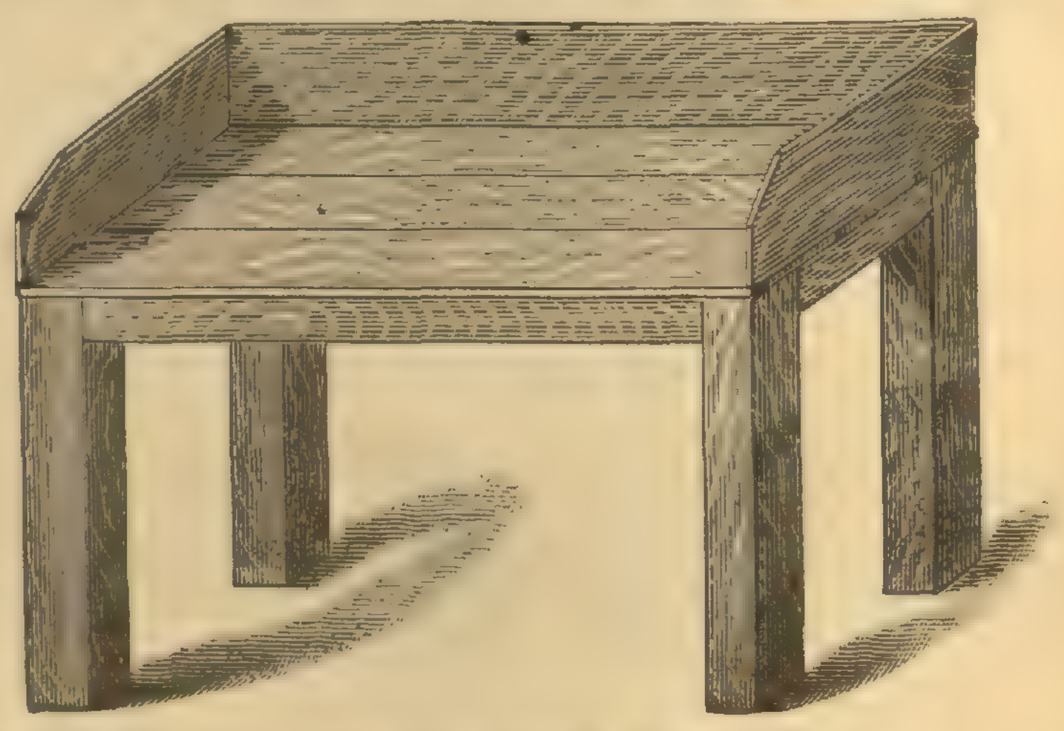

FIG. 269. POTTING-BENCH.

or whatever other attention they may require. In Potting hard-wooded plants of any description, the old ball should never be placed lower in the soil than it has previously been; if the stems are buried, certain death will, in most cases, be the result. These remarks apply more particularly to Heaths and numerous subjects of a like tender nature that are natives of Australia, the Cape, &c. In contrast to the class of plants just referred to, there are others which may have their stems buried at the time of Potting without the least fear of injury; these are mostly of the soft-wooded class, and need not be severally mentioned. Another point for reference is that of properly filling-in the space all round the old ball of earth. It is not an unfrequent occurrence, on turning a plant out after it has been shifted, to find the space round the lower part of the old ball only partly filled; this shows very inferior workmanship. If a plant is potted as it should be, all the additional soil given will have been rendered equally firm with the hand or hand-rammer, as the case may be, and thus the old and new soil will unite. Plants should never be Potted when the balls are dry or approaching dryness: they seldom get soaked afterwards when surrounded with soil of a moist nature, through which the water, when given, will pass readily, and leave the dry part to remain as before. The balls of earth and the soil used should, therefore, be as near

Pots and Potting—*continued.*

alike, regarding moisture, as may be practicable; either extreme must be avoided.

A strong Potting-bench is always requisite for the proper execution of work upon it. Unless the bench is firm, Potting on it is unsatisfactory, as the soil cannot be pressed or rammed unless the Pot rests upon a solid base. The shape and strength of material best suited for a strong Potting-bench are indicated in Fig. 269. Such a one made strong would last a very long time, and could be moved about to any part of the garden, if desired.

POTTERY-TREE. A common name applied to *Moquilea utilis.*

POTTLE. *See* **Measures.**

POUPARTIA. Included under **Spondias** (which *see*).

POUROUMA (the native name in Guiana). ORD. *Urticaceæ.* Of this genus of trees, about thirty species have been enumerated, natives of tropical South America. Flowers dicecious, numerously disposed, the males in glomerules or cymose-paniculate heads, the females in cymes; peduncles axillary, solitary or twin. Mature fruit distinct, erect, much larger than in allied genera. Leaves alternate, long-stalked, undivided or sometimes on the same tree palmately three to five-fid or parted; stipules large, very caducous. *P. edulis*, the only species which calls for mention here, requires culture similar to **Artocarpus** (which *see*).

P. edulis (edible). *fr.* in clusters, of the form and taste of Hazel nuts (much esteemed by the natives of Columbia). *l.* green above, bluish-white beneath, as large as those of *Wigandia imperialis.* Cold regions of Columbian Cordilleras, 1873. Greenhouse.

POURRETIA. A synonym of **Puya** (which *see*).

POURRETIA FRIGIDA. A synonym of **Dyckia frigida** (which *see*).

POUS, PODOS. Used in Greek compounds, this signifies a foot or stalk; *e.g.*, Podosperm (the same as Funiculus), the stalk on which some seeds are borne.

PRÆCOX. Appearing or developing comparatively early.

PRÆMORSE. Having an irregular, ragged termination; appearing as if bitten off.

PRAIRIE CLOVER. *See* **Petalostemon.**

PRASANTHEA. A synonym of **Paliavana** (which *see*).

PRASINUS. Grass-green.

PRASOPHYLLUM (from *Prason*, a Leek, and *phyllon*, a leaf; in allusion to the similarity which exists in the leaves). ORD. *Orchideæ.* A genus comprising about twenty-six species of greenhouse, terrestrial orchids; two are natives of New Zealand, one is New Caledonian, and the rest are Australian. Flowers small, in loose or dense, sessile spikes; the perianth often abruptly inflexed above the ovary. Leaves in a long sheath, sometimes elongated, terete, sometimes reduced to a short mucro. The species are of botanical interest only.

PRATENSIS. Inhabiting meadows.

PRATIA (named after M. Prat-Bernon, of the French Navy, who accompanied Freycinet, but died a few days after the expedition sailed). SYN. *Piddingtonia.* ORD. *Campanulaceæ.* A genus comprising about fifteen species of usually slender, prostrate or creeping, rarely tall, ascendent or erect, greenhouse or hardy herbs, natives of Tropical Asia, Australia, New Zealand, and South America. Flowers often rather small, in many species abortive, dicecious; calyx tube adnate, obovoid or turbinate; limb five-parted; corolla oblique, with incurved, oblique or sub-bilabiate lobes; peduncles axillary, one-flowered.

Pratia—*continued.*

Leaves alternate, frequently broad, toothed. For culture, *see* **Lobelia,** to which this genus is allied, and from which it principally differs in the fruit being a globose or obovoid berry, and not a dry capsule.

P. angulata (angled).* *fl.* white, nearly ½in. long, with the corolla tubular at the extreme base, and oblong, acute limbs; peduncles axillary, slender, 2in. long, ebracteate. Summer. *l.* shortly stalked, rather thick, sub-orbicular, truncate or rounded at the base, coarsely toothed. Stem creeping, slender, matted, with few large, scattered, spreading, white hairs. New Zealand, 1879. An extremely pretty little creeper for rockwork; quite hardy. SYN. *Lobelia littoralis.*

P. begoniæfolia (Begonia-leaved). *fl.* blue, small, on solitary pedicels. June to August. *fr.* purple, about the size of a Pea. *l.* roundish-cordate, serrated, petiolate, hairy on both surfaces, oblique at the base. Stems filiform, creeping, hairy. Nepaul, 1827. Greenhouse. (B. R. 1373.)

P. repens (creeping).* *fl.* white, with a violet tint, over ½in. long; corolla funnel-shaped, but split at the back; peduncles rather long, axillary, one-flowered. June to October. *l.* petiolate, rather reniform, undulately sub-crenated. Falkland Islands. A very pretty little hardy plant, well adapted for a sunny position on rockwork. SYNS. *Lobelia Pratiana, L. repens.*

PREMNA (from *premnon*, the stump of a tree; in allusion to the low stems of most species). SYN. *Baldingera.* ORD. *Verbenaceæ.* A genus comprising upwards of thirty species of glabrous, pubescent, or tomentose, stove shrubs, sub-shrubs, or trees, inhabiting the warmer regions of the Old World. Flowers white or bluish, small, disposed in terminal, trichotomous panicles, or in opposite cymes or clusters, forming a spike-like thyrse; calyx small, two-lobed or three to five-toothed; corolla tube short, cylindrical; limb spreading, four-fid. Leaves opposite, entire or toothed. Few of the species are cultivated in this country. They thrive in a compost of sandy loam, peat, and leaf mould, and may be increased by seeds, or by cuttings.

P. esculenta (edible). *fl.* disposed in small, terminal, contracted cymes; corolla yellowish white. May. *fr.* purple. *l.* very short-stalked, oblong, acuminate, slightly narrowed at base, dentate. Branchlets and cymes farinaceously-puberulous. *h.* 6ft. to 8ft. East Indies, 1824. Shrub.

P. integrifolia (entire-leaved). Headache-tree. *fl.* strongly-scented, disposed in a loosely corymbose, terminal panicle; corolla greenish-white. July. *l.* short-stalked, ovate or oval, entire or crenate-toothed above, opposite, sometimes whorled, 2in. to 3in. long. *h.* 10ft. to 12ft. East Indies, 1827. Tree. SYNS. *P. serratifolia, P. spinosa.*

P. latifolia (broad-leaved). *fl.* disposed in terminal, axillary, pedunculate panicles; corolla dirty-white. June. *l.* stalked, rotundate-cordate or oval, 2½in. long, coarctate-acuminate or obtuse, entire or obsoletely repand above, shining above, pale beneath. *h.* 15ft. East Indies, 1827. Erect, branched shrub or small tree.

P. serratifolia (serrate-leaved). A synonym of *P. integrifolia.*

P. spinosa (spiny). A synonym of *P. integrifolia.*

PRENANTHES (from *prenes*, drooping, and *anthos*, a flower; on account of the drooping flower-heads). Including *Harpalyce* and *Nabalus.* ORD. *Compositæ.* A genus comprising about sixteen species of hardy, erect, often tall and sub-scandent, glabrous or rarely hi-pid herbs, of which six inhabit Central Europe, the East Indies, and the Canary Islands, and the rest are North American. Flower-heads homogamous, purple, violet, white, or yellowish-white, often slender, drooping, loosely paniculate, rarely in sheathed, racemiform, erect panicles; style often long-exserted; involucre cylindrical, often narrow; receptacle flat, naked. Leaves alternate, mostly petiolate, sagittate-cordate, deeply pinnatifid or lyrate, or the upper ones narrow, sessile, and auriculate-amplexicaul. The species are not particularly ornamental. They thrive in any ordinary garden soil. All may be increased by seeds, sown in the open border, and the perennial species also by division. Those described below are perennials.

P. alba (white). *fl.-heads* white; involucre purplish, of about eight scales; pappus deep cinnamon. Late summer and autumn. *l.* angulate or triangular halbert form, sinuate toothed, or three to five-cleft. Stem corymbose-panicled at summit. *h.* 2ft. to 4ft. North America, 1762. (B. M. 1079.)

Prenanthes—*continued.*

P. purpurea (purple).* *fl.-heads* purple, disposed in loose panicles, long-stalked, nodding. August. *l.* oblong-lanceolate, cordate-amplexicaul, sub-denticulate, glaucous beneath. *h.* 4ft. Europe, 1658. (J. F. A. 317.)

P. virgata (twiggy). *fl.-heads* lilac, clustered, and mostly unilateral; involucre purplish, of about eight scales. August. *l.* lanceolate, acute, closely sessile, the upper ones reduced to bracts, the lower ones toothed or pinnatifid. Stem simple, 2ft. to 4ft. high. North America, 1823.

PREPTANTHE. A synonym of *Calanthe.*

PREPUSA (from the Greek word *prepo*, which means "I am handsome"; on account of the beauty of the flowers). ORD. *Gentianeæ.* A small genus (three species) of herbaceous or shrubby, erect, slightly branched, greenhouse plants, confined to Brazil. Flowers large, few, long-stalked, at length often nodding; calyx inflated, campanulate, shortly six-lobed; corolla campanulate, with six broad, short, twisted lobes. Leaves opposite, slightly fleshy, mostly approximate at the base of the stem; upper ones scattered, sessile or connate. For culture of *P. Hookeriana*, the only species hitherto introduced (probably not now in cultivation), *see* **Leianthus.**

P. Hookeriana (Hooker's).* *fl.* disposed in racemiform cymes of three to five; pedicels naked, elongated; corolla tube campanulate, the limb pale yellowish-white, with obovate, apiculate lobes. March. *l.* spathulate-lanceolate, slightly obtuse; cauline ones few, sub-connate at base. Stem herbaceous, purplish, almost simple. *h.* 1ft. 1839. (B. M. 3909.)

PRESCOTIA. *See* **Prescottia.**

PRESCOTTIA (named after John D. Prescott, a botanist, of St. Petersburgh). Erroneously spelt *Prescotia.* SYNS. *Decaisnea* (of Brogniart), *Galeoglossum.* ORD. *Orchideæ.* A genus comprising about a score species of stove, tropical American, terrestrial orchids, with fascicled, sometimes fleshy root-fibres, and leafy, slender, or tall, simple stems. Flowers small, spicate, sub-sessile; lateral sepals connate with the lip into a sac, the lip being fleshy, cucullate, and entire, with a couple of ears at its base. Leaves clustered at the base of the stem or radical, sessile or long-stalked, small or ample, membranous. The best-known species are given below. They are similar, both in habit and leaf characters, to *Stenorrhynchus*, and require a greenhouse temperature; they should be potted in well-drained loam.

P. colorans (coloured). *fl.* green, in a very long, erect, dense spike; petals subulate, ascendent; scape 2ft. long, glaucous-purplish. *l.* solitary, ovate-oblong, acuminate, cucullate at base, as long as the petioles. Brazil, 1834. (B. R. 1915.)

P. densiflora (dense-flowered). *fl.* whitish; sepals and petals revolute, almost round, acute, connate with the lateral sepals. *l.* rosulate, oblong, obtuse, many-nerved. Brazil, 1866.

P. plantaginea (Plantain-like). *fl.* greenish-white, disposed in a strict, dense, cylindrical spike; lip oblong, emarginate. *l.* erect, lanceolate-oblong, narrowed into a petiole which is shorter than the blade. Brazil, 1822. (H. E. F. 115; L. B. C. 990.)

PRESLIA (named in honour of C. B. and I. S. Presl, of Prague, authors of "Flora Sicula," 1818, "Flora Cechica," 1819, and other works). ORD. *Labiatæ.* A monotypic genus. The species is a hardy, prostrate, perennial herb, allied to *Mentha.* It thrives in any moist soil, and may be readily increased by divisions.

P. cervina (stag). *fl.* pale purplish, disposed in dense, many-flowered, axillary whorls, which are rather shorter than the floral leaves; calyx tubular, equal, four-toothed; corolla tube included, the limb equal and four-parted. June to August. *l.* sessile, linear, obtuse, quite entire, dotted, somewhat fascicled in the axils. Western Mediterranean region, 1684. SYN. *Mentha punctata.*

PRESTOEA (named after H. Prestoe, the present Director of the Trinidad Botanic Gardens). ORD. *Palmæ.* A genus comprising two species of pinnate-leaved, slender, dwarf, stove palms, with a reed-like caudex. For culture, *see* **Phœnix.**

P. montana (mountain). This is the correct name of the plant described in this work as *Euterpe montana.*

P. pubigera (puberulous).* *fl.* minute, sessile: outer spathe two-keeled, 5in. long, the interior one 1ft. to 1¼ft. long; peduncle

Prestoea—*continued.*

2in. to 4in. long; spadix branches twenty to thirty, the inferior ones 6in. long, much thickened at the base. *fr.* an ovoid berry. *l.* 3ft. to 4ft. long, pinnatisect at base, on petioles more than 2ft. long, green, with pale nerves, glabrous, chartaceous; lower segments somewhat distant, 1½ft. to 2ft. long, three lines broad Trunk 10ft. to 12ft. high. West Indies. SYN. *Hyospathe pubigera.*

PRESTONIA (named in honour of C. Preston, M.D., a correspondent of Ray). SYNS. *Exothostemon* and *Hæmadictyon.* ORD. *Apocynaceæ.* A genus comprising about thirty species of tall, climbing, twining, hirsute, pubescent or glabrous, stove shrubs, natives of tropical America. Cymes often densely corymbose or almost umbelliform, pseudo-axillary, sessile or shortly pedunculate. Leaves opposite, penniveined. Perhaps the only species worthy of mention is the one here described. It should be grown in a stove, and potted in a light, loamy soil. It makes a pretty specimen when trained upon pillars or a balloon trellis. Propagated by cuttings, rooted under a bell glass, in bottom heat.

P. venosa (veined). *fl.* yellowish-green, pale in the centre, in drooping racemes. June. *l.* lanceolate, glabrous, beautifully traversed by crimson veins. St. Vincent, 1821. SYN. *Echites nutans* (B. M. 2473).

PRETTY FACE. *See* **Calliprora lutea.**

PRICKING OFF, or PRICKING OUT. A term in constant use, which is applied to the removal of small seedling plants from the position in which they have been reared, and their insertion in single pots, or at a wider distance apart in pots, pans, or beds, where there is more space in which they may grow. The object is that of encouraging growth, and getting plants sufficiently strong to be placed in their permanent quarters without fear of injury. Pricking Out is generally best practised so soon as the first leaves appear after those which the seed produces from its interior. The necessity for this work may be much lessened by thin sowing; but still there are numerous instances in which it is unavoidable. Small plants, when Pricked Out, must receive every attention until they become so far established as, to a certain extent, to take care of themselves, and get large enough for transplanting or potting permanently.

PRICKLES. Sharp, hard, conical elevations of the epidermis or epiphlœum.

PRICKLY PEAR. *See* **Opuntia.**

PRIESTLEYA (named after Dr. Joseph Priestley, 1733-1804, the famous chemist). Including *Achyronia.* ORD. *Leguminosæ.* A genus comprising fifteen species of greenhouse, often silky-villous shrubs, natives of South Africa. Flowers yellow, in terminal, crowded heads or racemes, or rarely axillary; standard sub-orbiculate; wings falcate-obovate; keel incurved, beaked or slightly obtuse. Pods oblong or broadly linear, oblique, compressed, two-valved. Leaves simple, entire; stipules none. The species thrive in sandy peat. Water must be carefully administered; if too much is given, the plants will die. Propagation may be effected by cuttings of very young wood, inserted in sand, under a glass, and kept free from damp.

P. ericæfolia (Heath-leaved). *fl.* capitate, terminal, or in fascicles in the upper axils of the leaves; keel fuscous-purple at apex. June and July. *l.* linear-lanceolate, rather acute, ¼in. long, with somewhat revolute margins, hairy beneath, but at length glabrous above. Branches and calyces silky. *h.* 1ft. to 3ft. 1812.

P. sericea (silky). *fl.* disposed in a short, terminal spike, and, as well as the leaves and branchlets, clothed with adpressed pubescence. June and July. Pods hairy. *l.* ovate, acute, flat, one-nerved. *h.* 2ft. to 3ft. 1794.

P. Thunbergii (Thunberg's). *fl.* axillary, pedicellate. July and August. *l.* lanceolate, acute, smooth, the margins beset with silky hairs. Branches hairy. *h.* 2ft. to 3ft. 1819.

P. vestita (clothed). *fl.* capitate. May and June. *l.* ovate, concave, obtuse, nerveless, glabrous above, but, as well as the calyces and branches, clothed with hairy wool beneath. *h.* 2ft. to 4ft. 1800. (A. B. R. 382, under name of *Liparia villosa*; B. M. 2223, under name of *L. vestita.*)

Priestleya—*continued.*

P. villosa (villous). *fl.* capitate. June and July. *l.* ovate-elliptic, acute, one-nerved, flat, and, as well as the branchlets, calyces, and pods, hairy on both surfaces. *h.* 2ft. to 4ft. 1774. (B. M. 3216.)

PRIMORDIAL. First in order of appearance. The term is usually applied to first leaves.

PRIMROSE. *See* **Primula vulgaris.** The name was also formerly used for *Privet.*

PRIMROSE, CAPE. *See* **Streptocarpus.**

PRIMROSE, EVENING. *See* **Œnothera biennis.**

PRIMULA (from *primus*, first; referring to the early flowering). Primrose. ORD. *Primulaceæ.* A genus comprising from seventy to eighty species of mostly hardy, alpine, perennial, rhizomatous herbs, natives of Europe and temperate Asia, a few American, one or two found in the mountains of Java, and one in the frigid region of South America. Flowers white, pink, purple, or yellow, umbellately or verticillately racemose, very rarely solitary, involucral-bracted, ebracteolate; calyx tubular, funnel-shaped, or campanulate, often inflated or angular, with five persistent lobes; corolla hypogynous, infundibuliform or hypocrateriform, with a short or elongated tube, and a limb of five flat or concave, spreading or incurved, imbricated lobes. Leaves all radical, usually obovate-spathulate, rarely orbicular and long-stalked, entire, toothed, or rarely lobed. The various beautiful Auriculas have been derived from *P. Auricula.* Five of the species are natives of Britain, and include the well-known common Primrose (*P. vulgaris*), Cowslip (*P. officinalis*), and Oxlip (*P. elatior*), of our meadows and woods. The species described in the following pages are hardy, except where otherwise stated.

Primulas are charming and exceedingly useful plants, adapted collectively for various decorative purposes and positions under glass, and also in the open air. In them are represented great diversity of habits and growth, some being very dwarf and slow growing, while others develop and flower as large plants in a comparatively short time. Many of the hardy species are excellent subjects for sunny positions on rockwork; but some that are rare should receive special attention, or be kept in pots in a cold frame. Primulas of any description may be successfully grown in pots, if kept in the proper positions and temperatures which the several species and varieties require. The hardy ones may be kept in cold pits or frames throughout the summer, such as those with a north aspect; in winter, they must also be kept cool, and allowed to rest. Damp is one of the greatest enemies to hardy Primulas in winter, but still their roots must never be allowed to become too dry. All the small alpine species and their varieties should have their crowns kept well above the soil, and be maintained in position by placing pieces of sandstone on either side. This provision against damping applies to those grown in pots, in the open border, or on rockwork: it is always advisable to support the—in many instances, tiny—plants in this way. Varieties of the hardy Primrose are well adapted for naturalising in woods or shady places along with the common sort. A quantity of plants for this purpose may readily be raised from seed, a good strain of which should be secured.

Propagation of the species of *Primula* is most generally effected by seeds. The varieties of any section seldom reproduce themselves true from seed, and these have therefore to be propagated by cuttings or divisions. Careful division sometimes affords a method of increase amongst rare species when seeds are not procurable, and also more frequently amongst others that are commoner. Seeds of the hardy species are best sown, soon after they are ripe, in shallow pots or pans of light soil; the seeds should be thinly covered, and the pots placed in a cold frame, and kept shaded. When the seedlings appear, they should be placed near the glass, and, in due course, pricked out, or inserted singly in small pots of soil similar to that in which the seeds were sown.

Primula—*continued.*

P. japonica, one of the finest, strong-growing species, succeeds well in pots for greenhouse decoration, and also when planted on rockwork or in the open border. The seeds of this species should be sown when ripe, and the plants, when raised, grown on to flower the second spring following. As they are very vigorous, rich soil and rather large pots should be provided for them after the first winter has passed. If the flowers appear on plants within a year after the seed has been sown, it is not so desirable as when they can be kept back until starting time, after two winters have passed. *P. japonica* never requires any fire-heat; all the leaves die down in winter, when the pots may be stored in a cold frame, and kept moderately, but not quite, dry. *P. obconica*, a pretty and very popular plant, is best adapted for pot culture; it flowers, more or less, in a cool greenhouse or conservatory, nearly all the year. Propagated, in spring, by carefully-made divisions, and by seeds. Another Primula well suited for pot culture in greenhouses is *P. cortusoides Sieboldii*, of which there are several beautiful varieties, all worthy of more extended culture than they at present receive.

Perhaps the best-known Primula is that which is very generally and extensively cultivated for greenhouse and room decoration from autumn till late in spring, namely, the Chinese Primrose (*P. sinensis*). Of this beautiful and popular species, there are single and double varieties, but plants of the former kind are more easily grown, and more frequently seen in gardens, than are those of the latter. These Primulas are always most acceptable in winter, when their bright and cheerful flowers appear to best advantage, and suggest the return of spring; at the latter season, however, the plants attain their greatest degree of perfection. To keep a succession of the single ones in flower, the first portion of seed should be sown in March, for growing plants in preparation for the ensuing autumn, and other sowings should be made in April, May, and June. Shallow pans are best for the seed; they should be well drained, and filled with light soil, composed chiefly of leaf mould, with a little loam and sand. The surface may be slightly pressed, to make it even, and the seeds must only be very lightly covered; the pans should then be placed in a warm frame or pit, and kept shaded. A pane of glass, laid over the top of each pan, will prevent rapid evaporation, and watering need not then be frequently practised until germination takes place. The young plants should be left in the seed-pans or pots until ready to pot off singly, unless any of them show signs of damping, in which case they are best pricked off at once in new soil, about 1in. apart, and kept shaded for a few days. In about a fortnight, a cold frame will be the most suitable place, as the plants must be kept near the light, and have plenty of air while growing, to insure what is most essential—a compact, sturdy habit. As the soil in small pots becomes filled with roots, shift on into others 5in. in diameter, a size sufficiently large for Chinese Primulas to flower in. For the final potting, an open and rather rich soil is necessary, consisting of two parts loam to one each of well-decayed manure and leaf mould, a little charcoal or sand being added to insure porosity. The pots should be clean, well drained, and perfectly dry when used. Ventilation, watering, and shading, are the principal points requiring attention in the general management. Throughout the summer, a slight shading, or screen from the sun's rays, is necessary through the hottest part of the day: a thick or continuous shading is more injurious than beneficial. Liberal supplies of water are required in summer; but towards autumn, and in the winter, it

Primula—*continued.*

must be carefully administered. A light, airy house, where the plants may be kept near the glass, is best for these Primulas, when in flower, during the winter or spring; and a temperature of from 50deg. to 55deg. is better, at that period, than a higher one. In potting, the plants should be inserted so that their bases just touch the soil when the work is completed; the crowns must not be buried, but, if situated too high, they are always tumbling about afterwards.

FIG. 270. PRIMULA AURICULA.

Double varieties of *P. sinensis* must be propagated by cuttings, but some of the semi-double forms reproduce themselves from seed. Old plants, after flowering, should be encouraged to start a little growth, when they may be cut up, and each division inserted as a cutting. Some cultivators surround the base of the stems with leaf mould, into which the roots grow, and, when the divisions are made, plants instead of cuttings are already fit for potting off. Double varieties require culture very similar to single ones after they are established, but they will bear a little higher temperature when flowering.

VARIETIES. Of *P. sinensis* there are several strains which receive separate names, but, for general purposes, distinct, fimbriated white and red varieties are, if kept separate, sufficient. A greater diversity can, however, be procured by purchasing or saving mixed seeds from good, large, fimbriated flowers. The strain is of great importance, as there are so many inferior ones. All vendors of seed, doubtless, endeavour to supply the best quality; but varieties degenerate so fast, and all the inferior ones produce seed so freely, that the reputed quality is not always to be relied on. *P. s. filicifolia alba*, *filicifolia rubra*, *fimbriata alba*, and *fimbriata rubra*, are those most commonly grown; other sub-varieties of *fimbriata* are: Alba Magnifica, Chiswick Red, Coccinea, Marginata, Meteor, Scarlet Gem, Village Maid, and Waltham White. Of double varieties, the old Double White is one of the best and most useful winter-flowering plants grown. There are a few double sorts with coloured flowers; they are very useful for cutting, but are not extensively cultivated.

P. acaulis flore-pleno (double, stemless). A garden name for *P. vulgaris flore-pleno*.

Primula—*continued.*

P. Allionii (Allioni's).* *fl.* mauve, with a white eye, large, about 1in. across, either solitary or in twos, on very short peduncles. April. *l.* obovate or sub-spathulate, when fully developed narrowed into a petiole, slightly and irregularly toothed. All parts of the plant, except corolla and capsule, are densely clothed with a short, glandular pubescence. Mountains north of Mentone. (Fl. Ment. 63.) *P. tyrolensis*, from the Tyrol, is a geographical form of this species.

P. altaica (Altaic).* *fl.* mauve or purplish-crimson, with a yellow centre, as large as those of the common Primrose, and numerously produced. Spring. *l.* obovate, younger ones lanceolate, sinuate-crenate, or nearly entire, obtuse, marked with narrow veins, and slightly mealy. *h.* 3in. to 5in. Altai, 1819. (P. M. B. xvi. 194.)

P. amœna (pleasing). A garden synonym of *P. cortusoides Sieboldii*.

P. Auricula.* Common Auricula. *fl.* of various colours, but normally yellow, umbellately disposed on many-flowered stalks; tube of corolla gradually widening upwards, nearly three times the length of the bell-shaped calyx. Spring. *l.* oblong-lanceolate or obovate, more or less minutely glandular-toothed, fleshy, glaucous-mealy. *h.* 3in. European Alps, 1596. A well-known species. See Fig. 270. (B. M. 6837; G. M., Ap. 24, 1886; J. F. A. 415; R. G. 194 and 195.) *P. Balbisii* is a pretty, yellow-flowered form. *P. Goebelii* is a natural hybrid, with brownish-violet flowers. For cultivation, varieties, &c., *see* **Auricula.**

P. auriculata (eared).* *fl.* purplish, with a white eye, five or six in a drooping umbel; corolla tube 1in. to 1½in. long, three times the length of the calyx, the lobes narrower than those of *P. farinosa*. Early summer. *l.* oblong or obovate, smooth, slightly crenate, pale but not mealy beneath. *h.* 4in. Austrian mountains, 1825. A pretty species, closely allied to *P. farinosa*, but readily distinguished by its much longer flowers. (B. M. 392, under name of *P. longifolia*.)

P. Balbisii (Balbi's). A form of *P. Auricula*.

P. Boveana (Bove's).* Abyssinian Primrose. *fl.* yellow, very numerous, on straight, axillary pedicels; corolla twice or thrice as long as the calyx, with a slightly-constricted throat. March. *l.*, lower ones rosulate, ovate, unequally argutely toothed; upper ones whorled, ovate or ovate-lanceolate, sessile, argutely incised-toothed, acuminate. *h.* 6in. Mount Sinai, 1826. Greenhouse. (B. M. 2842, under name of *P. verticillata*.)

P. calycina (calycine).* *fl.* purple, in short-stalked umbels. May and June. *l.* numerous, sessile, imbricated, oblong or broadly-lanceolate, acute, entire, with a horny, wavy margin, glossy-green above, glaucous beneath. 1838. Alps of Lombardy. (S. B. F. G. ser. i., t. 254, under name of *P. glaucescens*.)

P. Candolleana (De Candolle's). A synonym of *P. integrifolia*.

P. capitata (headed).* *fl.* deep violet-blue, in dense, round heads 1½in. across, and enveloped in a white, mealy powder; scapes from 6in. to 9in. high. April to June. *l.* oblong, mealy on the under side, sometimes of a golden hue, finely wrinkled and toothed. Himalaya, 1850. One of the finest species. It makes a fine pot-subject, but will not endure a heated greenhouse. It should be grown in a cold frame, with plenty of air, and may be

FIG. 271. PRIMULA CAPITATA, showing Habit and detached Inflorescence.

Primula—*continued.*

planted on rockwork where it will not get the midday sun. See Fig. 271. (B. M. 4550; R. G. 985.)

P. Clusiana (Clusius'). *fl.* bright rose, about 1in. in diameter, in stalked umbels. April and May. *l.* broadly ovate, slightly pubescent; margins obscurely toothed. *h.* 6in. to 9in. Tyrol. (J. H. ser. iii. vol. xi. p. 356.)

P. cortusoides (Cortusa-like).* *fl.* deep rose, disposed in umbels; scapes about 6in. long. Early summer. *l.* large, soft, cordate, almost lobed, crenated, wrinkled, on stalks 2in. to 4in. long. *h.* 6in. to 10in. Siberia, 1794. Very distinct. (A. B. R. i. 7; B. M. 399.)

FIG. 272. PRIMULA CORTUSOIDES SIEBOLDII, showing Habit and detached Single Flower.

P. c. Sieboldii (Siebold's).* *fl.* fine deep rose, with a white eye, but very variable, from 1in. to 1¾in. across; umbel six to ten-flowered. April. *l.* ovate, the larger ones somewhat cordate at the base, coarsely and irregularly toothed, 2in. to 3in. long, and nearly as much broad. Root creeping. *h.* 8in. to 12in. Japan, 1865. A variety larger and handsomer than the type. See Fig. 272. (B. M. 5528.) SYN. *P. amœna* (of gardens).

P. Courtii (Court's). A synonym of *P. verticillata simensis.*

P. davurica (Dahurian). *fl.* pink, with a lemon-coloured eye; corolla hypocrateriform, with obcordate, emarginate lobes; involucre many-flowered. May. *l.* lanceolate-spathulate, subentire, glabrous. *h.* 3in. Dahuria, Siberia, 1806. (B. M. 1219, under name of *P. intermedia.*)

P. decora (decorous). A variety of *P. viscosa.*

P. denticulata (toothed).* *fl.* bright lilac, small, in dense, round heads or umbels, each blossom being about ½in. across, with a prettily-cupped corolla; scape long, somewhat dark-coloured. Spring and early summer. *l.* oblong-lanceolate, wrinkled, toothed, hairy on both surfaces, and densely so underneath, where they are also more or less covered with a white mealiness. *h.* 8in. to 12in. Himalaya. A handsome species, thriving best in a moist position, and in leaf mould. (B. M. 3959; B. R. 1842, 47; S. E. B. ii. 114.) *P. d. pulcherrima* is a great improvement on the type; it grows from 10in. to 12in. high, and has a more globular flower-truss, of a deeper lilac colour.

P. d. cashmeriana (Kashmir).* *fl.* light purple, with a yellow eye, small, and densely arranged in globular trusses; scape from 9in. to 12in. high, very stout and mealy, thickening near the top. March to May. *l.* oblong, serrated, pale green, the under surfaces beautifully covered with a meal resembling gold-dust. Kashmir, 1879. A handsome variety, preferring a moist situation, where it will endure any amount of sunshine. During winter, the crowns are liable to rot, from the amount of moisture lodging therein; it is advisable, therefore, to place a piece of glass over them. See Fig. 273. (F. M. n. s. 360; R. H. 1880, p. 330.)

P. elatior (taller). True Oxlip. *fl.* pale yellow, horizontal or drooping, disposed in peduncled umbels; corolla limb concave; throat open, without folds. April and May. *l.* on winged petioles. *h.* 1ft. Europe (Britain). This species differs from *P. vulgaris* in the less inflated calyx, shorter pedicels, and capsule longer than the calyx tube. It is intermediate between that species and *P. officinalis.* (Sy. En. B. 1131; B. R. 896 and L. B. C. 1585, under name of *P. Pallasii.*) *P. e. amœna* is a pretty form from the Caucasus, with purple flowers. (B. M. 3252, under name of *P. amœna.*)

P. elegans (elegant). A garden synonym of *P. sibirica kashmiriana.*

P. erosa (bitten). *fl.* in dense, umbellate heads, lavender or purple, covered with meal. Early spring. *l.* oblong-spathulate or oblanceolate, coarsely and unevenly toothed. *h.* 4in. to 8in. Himalaya. Similar to *P. denticulata.*

FIG. 273. PRIMULA DENTICULATA CASHMERIANA, showing Habit and detached Single Flower.

P. farinosa (mealy).* Bird's-eye Primrose. *fl.* light purple, with a yellow eye, about ½in. across, arranged in compact umbels, on a stalk longer than the leaves; corolla tube about equalling

FIG. 274. PRIMULA FARINOSA, showing Habit, and detached Umbel of Flowers and Leaf.

Primula—*continued.*

the mealy calyx, the lobes narrow and deeply notched. Early summer. *l.* small, about 1in. long, ovate-oblong, roundly toothed, smooth above, clothed beneath with a white, mealy down. *h.* 3in. to 12in. Northern and Central Europe (Britain). A little gem; a stiff soil and a damp situation suit it well, and it should be screened from the midday sun. See Fig. 274. (L. B. C. 1649; Sy. En. B. 1134.) *P. f. acaulis* is a diminutive variety.

P. Fedtschenkoi (Fedtschenkow's). *fl.* deep violet-purple, in whorls after the manner of *P. japonica*. Summer. *l.* oblong-obovate, hardly crenated, almost sessile. *h.* 6in. to 9in. Turkestan, 1884.

P. Flörkiana (Flörke's). *See* **P. minima.**

P. floribunda (bundle-flowered).* *f.* yellow, small, disposed in whorls, on erect scapes, 4in. to 8in. high. *l.* stalked, elliptic-lanceolate, toothed, glandular-pubescent. Western Himalayas, 1883. A charming plant. (B. M. 6712.)

P. glutinosa (glutinous).* *fl.* brilliant bluish-purple, with the divisions rather deeply cleft, nearly sessile, clustered. Early summer. *l.* lanceolate wedge-shaped, obtuse, smooth; margins serrated. *h.* 4in. South Europe, 1824. A very beautiful and distinct species, rarely seen in cultivation. (J. F. A. v. App. 26.)

P. Goebelli (Goebl's). *See* **P. Auricula.**

P. grandis (large). *fl.* yellow, on long pedicels, umbellate; scape long. *h.* 9in. Central Asia, 1878. A distinct species, remarkable only for the large size of its foliage and the smallness of its flowers. (R. G. 968.)

P. imperialis (imperial). A synonym of *P. prolifera*.

P. integrifolia (entire-leaved). *fl.* rose, from one to three on scapes 2in. to 3in. long; corolla deeply lobed; tube longer than the calyx. Spring and early summer. *l.* elliptic or oblong, entire, smooth, shining, ciliate at the edge. *h.* 3in. Pyrenees and Switzerland, 1792. An elegant little species. (B. M. 942; J. F. A. iv. 327; L. B. C. 886.) SYN. *P. Candolleana*.

P. involucrata (involucred).* *fl.* creamy-white, with a yellowish eye, disposed in umbels; corolla lobes roundish; involucre membranous, much divided. Spring. *l.* erect, oblong-lanceolate, bright green, narrowed into the leafstalk. *h.* 5in. to 7in. North India, 1845. A distinct species, requiring a moist situation; it thrives freely in pots plunged half-way in water. (B. R. xxxii. 31; R. G. 1863, 394.)

P. i. Munroi (Captain Munro's).* *fl.* white, with a yellowish eye, fragrant, in a head on stems 5in. to 7in. high; corolla inflated above the middle, with rounded, two-cleft lobes, more than 1in. across. March to May. *l.* long-stalked, nearly cordate, obtuse, slightly indented, smooth. *h.* 6in. to 8in. North India, 1845. (B. R. xxxiii. 15, under name of *P. Munroi*.)

P. japonica (Japanese).* Japanese Primrose. *fl.* variously coloured, crimson, maroon, lilac, rosy-pink, or white, with a differently-coloured eye, and about 1in. in diameter; scapes from 1ft. to 2ft. high, bearing five or six many-flowered whorls. Spring. *l.* large, oblong-spathulate, coarsely irregularly and sharply-toothed, sessile. *h.* 1ft. to 1½ft. Japan, 1871. One of the most beautiful hardy perennials in cultivation. It makes vigorous growth in moist, shady spots, in deep, rich loam. The seeds sometimes take a considerable time to germinate; they come up quickly, however, if sown so soon as they are ripe. (B. M. 5916.)

P. Kaufmanniana (Kaufmann's). *fl.* glossy-violet, in two whorls of from ten to eighteen, almost 1in. broad. Summer. *l.* softly pubescent, long-stalked, orbicular, with a deeply cordate base, lobed; lobes irregularly serrated. *h.* 6in. to 12in. Turkestan, 1883.

FIG. 275. PRIMULA LUTEOLA, showing Habit and detached Single Flower.

P. lutcola (yellowish).* *fl.* pale or sulphur-yellow, deepening to a golden-yellow about the throat, numerously disposed in compact, roundish heads, elevated on tall scapes usually about 1ft. in height. Summer. *l.* oblong, 6in. to 12in. long, narrowed

Primula—*continued.*

towards the base and toothed at the margin. *h.* 1½ft. to 2ft. Caucasus, 1867. A handsome species, requiring a moist situation in full exposure. See Fig. 275. (R. G. 541.)

FIG. 276. PRIMULA MARGINATA.

P. marginata (margined).* *fl.* violet-rose, with a mealy throat; scape many-flowered. April and May. *l.* oblong or obovate, deeply and unequally toothed; margins silvery from mealy dust. *h.* 2in. to 4in. Switzerland, 1777. A very pretty and distinct species. See Fig. 276. (B. M. 191; Fl. Ment. ii.; L. B. C. 270.) There is a form known as *major*, which is larger in all its parts, and has deeper-coloured flowers, than the type.

P. minima (least).* Fairy Primrose. *fl.* usually rose, but sometimes white, comparatively large, generally nearly 1in. across, solitary, but sometimes twin. Summer. *l.* wedge-shaped, nearly square at the ends, about ½in. long, smooth, shining, toothed at the top. *h.* 1½in. South Europe, 1819. A very small-growing species, requiring a sandy-peat and loam soil. (B. R. 581; L. B. C. 315.) *P. Flörkiana* is like this; it is a hybrid, of which *P. minima* is one of the parents.

P. mistassinica (Lake Mistassini). *fl.* red; corolla hypocrateriform, with obcordate, sub-emarginate lobes; involucre one to eight-flowered. June. *l.* veined, spathulate, dentate or crenate, obtuse or acute, glabrous, sub-coarctate at base. *h.* 3in. North America, 1818. (B. M. 2973; H. E. F. 68.) SYN. *P. pusilla* (B. M. 3020; L. B. C. 1726).

P. mollis (soft).* *fl.*, calyx and corolla tube red, the spreading limb deep rose, with a dark blood-coloured ring round the eye; scapes 1ft. to 1½ft. high, bearing three or four whorls of blossoms, each of which is nearly 1in. across. May. *l.* long-stalked, cordate, hairy on both surfaces, the petioles clothed with spreading white hairs. Bootan, Himalaya, 1854. A very distinct and rare species. (B. M. 4798.)

FIG. 277. UMBEL AND DETACHED SINGLE FLOWER OF PRIMULA OFFICINALIS.

Primula—*continued.*

P. nivalis (snowy).* *fl.* pure white, freely produced in large trusses on stems as high again as the leaves; corolla lobes obcordate. Spring. *l.* obovate or spathulate, ciliated, smooth, flat, sharply and irregularly toothed. *h.* 4in. to 9in. Caucasus, &c., 1790.

P. n. farinosa (mealy). *l.* mealy beneath. Central Asia, 1878.

P. n. longifolia (long-leaved). *fl.* dark violet. *l.* ovate-oblong to lanceolate-oblong. Central Asia, 1878. (R. G. 930.)

P. n. turkestanica (Turkestan). *fl.* rose, generally in two dense whorls, and about 1in. in diameter. *l.* oblong, flat, obtuse, smooth above, white below. *h.* 6in. Turkestan, 1878. One of the handsomest varieties in cultivation. (R. G. 930.)

P. obconica (obconical).* *fl.* pale lilac or purplish, drooping, umbellate; calyx between campanulate and funnel-shaped; corolla with a cylindric tube and a flat limb 1in. in diameter. Spring and summer. *l.* radical, many, petioled, broadly ovate-oblong, cordate or rounded-cordate, the margins lobulately toothed or nearly entire. *h.* 6in. to 12in. Central China, 1882. (G. C. n. s., xix. 121; Gn., Sept., 1884.) SYN. *P. poculiformis* (B. M. 6582).

P. officinalis (officinal). Cowslip; Palsywort. *fl.* bright yellow, in terminal umbels, hanging more or less to one side; calyx lobes obtuse; corolla limb cup-shaped. Spring and summer. *l.* generally smaller than those of the common Primrose, much narrowed towards the base, thickly pubescent with short, stiff hairs. *h.* 4in. to 12in. Europe (Britain), West Asia. A well-known plant, from which the Polyanthus (*P. variabilis*) is supposed to have originated. See Fig. 277. (Sy. En. B. 1130; L. B. C. 1597, under name of *P. inflata*.) SYN. *P. veris.* *See also* **Polyanthus.**

FIG. 278. UMBEL AND DETACHED FLOWERS OF PRIMULA OFFICINALIS ELATIOR DUPLEX.

P. o. elatior duplex (taller, double). A curious garden form, with a petaloid calyx. See Fig. 278.

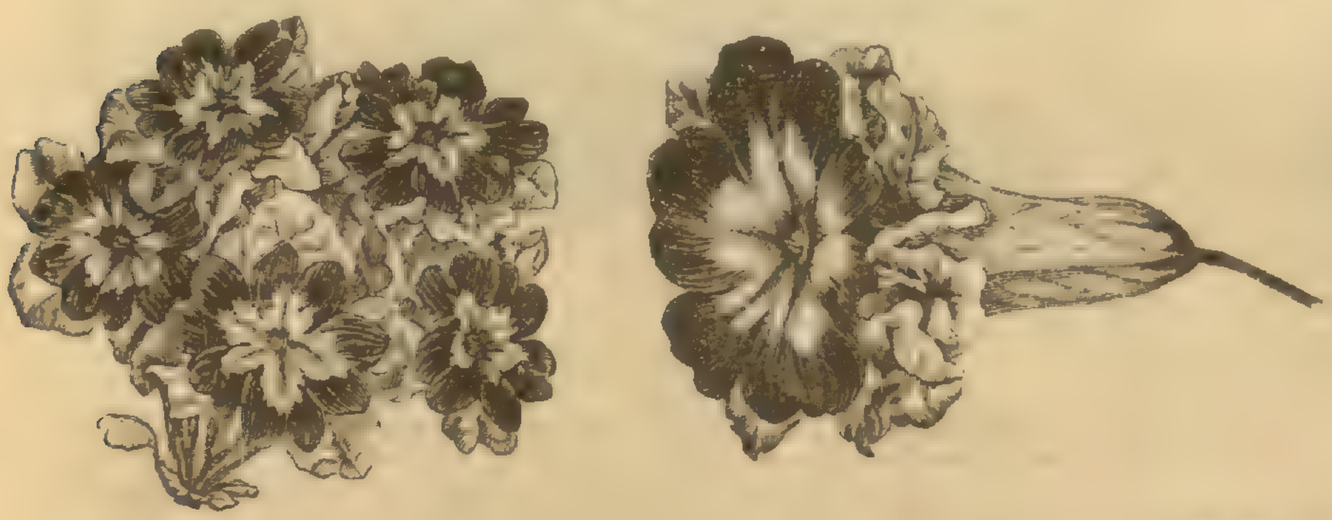

FIG. 279. UMBEL AND DETACHED SINGLE FLOWER OF PRIMULA OFFICINALIS MACROCALYX.

P. o. macrocalyx (large-calyxed). A garden form, with the calyx foliaceous, and abnormally developed. See Fig. 279.

P. Palinuri (Palinuri). *fl.* bright yellow, with a Cowslip-like perfume and a funnel-shaped corolla, disposed in a drooping umbel at the top of the powdered scape. April and May. *l.* broad-spathulate, smooth, sharply and unequally toothed, bright pale green, almost as large as those of young Cabbages. *h.* 6in. to 9in. Palinuri, Southern Italy, 1816. A vigorous-growing and distinct species. (B. M. 3414; H. E. F. 118.)

P. Parryi (Parry's).* *fl.* bright purple, with a yellow eye, nearly 1in. across; scapes long and stout, bearing about a dozen fine large blossoms in a panicle at the top. Spring. *l.* erect, narrowly obovate-oblong, obtuse or sub-acute, sessile or narrowed into the very broad petiole, obscurely toothed or entire, 5in. to 9in. long. *h.* 6in. to 18in. Rocky Mountains, 1865. A beautiful, large species. (B. M. 6185.)

Primula—*continued.*

P. poculiformis (cup-shaped). A synonym of *P. obconica.*

P. prænitens (very glossy). A synonym of *P. sinensis.*

P. prolifera (proliferous). *fl.* yellow, ½in. in diameter; scape tall, bearing several whorls of flowers. *l.* large, obovate-oblong, denticulated along the margins. *h.* 6in. to 24in. Himalaya and Java, 1884. A very distinct and pretty species. (B. M. 6732; R. G. 1204.) SYN. *P. imperialis.*

P. pubescens (downy). *fl.* rosy-crimson, in very large heads. April. *l.* obovate-oblong, dentate-serrate at apex, the margins densely glandular-ciliate. *h.* 3in. to 6in. South Europe, 1800. A fine hybrid, of which *P. Auricula* is one of the parents. (R. G. 1198A.)

FIG. 280. PRIMULA SIKKIMENSIS, showing Habit and detached Single Flower.

P. pusilla (weak). A synonym of *P. mistassinica.*

P. rosea (rosy).* *fl.* bright rosy-carmine, with a yellow eye, nearly 1in. across, disposed in heads of from six to ten blossoms, on stout scapes 4in. to 6in. high. Spring. *l.* pale bright green, smooth, 3in. to 6in. long, in shape resembling those of the common Primrose, but not wrinkled; edges slightly serrated and crimped. *h.* 4in. Kashmir, 1879. A handsome species, with a neat habit. (B. M. 6437; F. M. n. s. 360.)

P. sapphirina (sapphire-coloured).* *fl.* pale blue, borne on slender scapes 1in. to 2in. high. *l.* spathulate-obovate, obtuse, toothed, disposed in rosettes about ½in. in diameter. Sikkim (at 13,000ft. to 15,000ft. elevation), 1884. A minute species. (G. C. n. s., 1884, xxi. p. 545.)

P. scotica (Scotch).* *fl.* rich purple, with a yellowish eye; tube of corolla about equalling the calyx and twice as long as the lobes; umbel few-flowered. June. *l.* obovate-lanceolate, toothed, even, powdery on both sides. *h.* 2in. to 4in. Scotland. A lovely little species, very like *P. farinosa*, but smaller, and proportionately stouter. (L. B. C. 652; Sy. En. B. 1135.)

P. sibirica (Siberian). *fl.* red; corolla campanulate, the segments lanceolate-ovate or lanceolate, acute or slightly obtuse; involucre three to five-flowered. May. *l.* slender, flat, smooth, obovate, entire, obtuse, very glabrous, long-petioled, with undulated margins. *h.* 3in. Siberia, 1818. (B. M. 3167.) *P. s. integerrima* is a variety with very entire leaves. (B. M. 3445.)

P. s. kashmiriana (Kashmir). *fl.* rosy-lilac, in stalked umbels. June. *l.* long-stalked, ovate-elliptical. *h.* 6in. Western Himalaya, 1879. A handsome, glabrous species. (B. M. 6493.) SYN. *P. elegans*, of some gardens.

P. sikkimensis (Sikkim).* *fl.* pale yellow, nearly 1in. long and more than ½in. across, numerously disposed in large umbels, which sometimes produce as many as sixty blossoms; scapes from 1½ft. to 2ft. high. Summer. *l.* rough, wrinkled, obovate-oblong, obtuse, bidentate, attenuated into a footstalk. *h.* 1½ft. to 2ft. Sikkim Himalaya, 1850. See Fig. 280. (B. M. 4597.)

P. sinensis (Chinese).* Chinese Primrose. *fl.* white or pale lilac, normally small, the edges of the limb quite smooth, with a terminal notch in each segment. Spring. *l.* fleshy, with sinuated

Primula—*continued.*

FIG. 281. PRIMULA SINENSIS.

edges and hairy surface. *h.* 9in. China, 1820. Greenhouse. See Fig. 281. (B. M. 2564; H. E. F. 105; L. B. C. 916, 1926; L. C. B. 7; R. G. 1861, 346.) SYN. *P. prænitens* (B. R. 539). Of this now very extensively-grown species, a considerable number of varieties, differing both in foliage and flower characters, have

FIG. 282. PRIMULA SINENSIS FLORE-PLENO.

originated in gardens. There is a good strain of double forms, with a rather large range of colour variation. One is represented in Fig. 282.

P. spectabilis (showy). *fl.* deep rosy-purple, six to eight in an umbel; scape 3in. to 4in. high. July. *l.* elliptic, thick and fleshy, with entire, cartilaginous margins. *h.* 4in. Eastern Alps, 1879.

P. s. Wulfeniana (Wulfen's).* A form with more pointed leaves than those of the type. See Fig. 283.

P. Steinii (Stein's).* *fl.* bright purple, very shortly stalked. April and May. *l.* spathulate-obovate, toothed. A handsome hybrid (of which *P. minima* is one of the parents), of very dwarf, densely-tufted habit. (R. G. 991, f. 1-3.)

P. Stuartii (Stuart's).* *fl.* rich golden-yellow, in many-flowered umbels. Summer. *l.* nearly 1ft. long, broadly lanceolate, smooth above, mealy below, sharply serrated. *h.* 9in. to 18in. Northern India, 1845. A handsome and vigorous-growing species, requiring a good, light, and deep soil. See Fig. 284. (B. M. 4356.)

P. suffrutescens (sub-shrubby). *fl.* rosy-purple, with a yellow eye, 1in. in diameter, disposed in umbels. Spring. *l.* narrow,

Primula—*continued.*

cuneate-spathulate, 1½in. to 2in. long, toothed at the apex. Stems long, straggling, somewhat woody. California, 1884. A pretty rockwork plant.

FIG. 283. PRIMULA SPECTABILIS WULFENIANA.

P. tyrolensis (Tyrol). *See* **P. Allionii.**

FIG. 284. PRIMULA STUARTII, showing Habit, detached Inflorescence, and Single Flower.

P. variabilis (variable), of Goupil. A hybrid plant, which not unfrequently occurs wild in Britain, in company with its two parents, the Primrose and the Cowslip. It is often taken for the true Oxlip (*P. elatior*). See Fig. 285.

P. venusta (charming). *fl.* purple; corolla thrice as long as the calyx; involucre much shorter than the pedicels; scape glabrous. April. *l.* ovate, dentate, serrate, or almost entire, glabrous on both surfaces. *h.* 3in. Hungary, 1833. (B. R. 1983.)

P. veris (spring). A synonym of *P. officinalis.*

P. verticillata simensis (whorled, Simen).* *fl.* yellow; scape bearing two or three tiers or whorls of flowers, the stalks of which measure some 2in. in length; the whorls provided with spreading, leafy bracts, those in the lower whorls being the largest, measuring 4in. to 5in. long, and 1½in. broad; corolla salver-shaped, with a tube nearly 2in. long, dilated at the upper extremity, the lobes notched. Spring. *l.* oblong-lanceolate, 8in. to 10in. long, covered with white, mealy powder, especially on the lower surface, irregularly dentate. *h.* 1ft. to 1½ft. Abyssinia, 1870. A very desirable, greenhouse species. (B. M. 6042.) SYN. *P. Courtii.*

P. villosa (villous). A synonym of *P. viscosa.*

P. viscosa (clammy).* *fl.* rosy-purple, with a white eye, disposed in umbels on viscid scapes; corolla lobes cordate, gashed, the tube twice as long as the bell-shaped calyx. Early

Primula—*continued.*

FIG. 285. PRIMULA VARIABILIS.

summer. *l.* obovate or sub-orbicular, with closely-set teeth, dark green, covered with glandular hairs, and viscid on both sides. *h.* 2in. to 4in. Pyrenees, 1768. A handsome species. See Fig. 286. (B. M. 14; J. F. A. v. App. 27; L. B. C. 182; R. G. 656.) SYN. *P. villosa.* *P. decora* is a slight variety of this species (B. M. 1922; L. B. C. 1480.)

FIG. 286. PRIMULA VISCOSA, showing Habit and detached Umbel of Flowers.

P. v. latifolia (broad-leaved). *fl.* violet, with mealy throat and calyx, fragrant; umbel from one to twenty-flowered. Early summer. *l.* obovate or oblong, sometimes 4in. long, and nearly 2in. broad, serrately toothed from middle upwards, ciliate, hairy on both surfaces. *h.* 4in. to 8in. Pyrenees, 1820. (Fl. Ment. 12; R. G. 122.)

P. v. pedemontana (Piedmont).* *fl.* rosy-purple, with a yellowish-white eye, collected into a dense head, on scapes from 2in. to 4in. in height; throat of corolla not farinose. Spring. *l.* oblong or ovate, obsoletely repand-toothed, with fimbriated margins. *h.* 6in. Piedmont, 1826. (B. M. 5794.)

P. vulgaris (common).* Common Primrose. *fl.* usually pale yellow, with a flat limb; calyx tube inflated, five-angled; lobes acuminate; umbels sessile, giving the appearance of being solitary. Spring. *l.* tufted, sessile. *h.* 3in. Europe (Britain). (Sy. En. B. 1129.) There are numerous garden forms of this species (frequently met with under the name of *P. acaulis*), a double-flowering one being represented by Fig. 287.

PRIMULACEÆ. A natural order of herbs, of variable habit, usually with a perennial rhizome, very rarely sub-shrubby at base; they mostly inhabit Northern temperate (especially alpine) regions, being rare in the

Primulaceæ—*continued.*

Southern hemisphere, and very scarce in the tropics. Flowers hermaphrodite, usually regular, small or rather large, sometimes axillary and solitary, often racemose, or solitary or umbellate at the apex of an elongated scape, the inflorescence centripetal; calyx free, or very rarely adnate to the ovary, four to nine-fid or parted, usually persistent; corolla hypogynous, generally gamopetalous, rotate, hypocrateriform, or infundibuliform-campanulate, with a short or elongated tube; limb four to nine-parted or four to six-lobed, the lobes or segments entire, emarginate, or fimbriate-lacerate, imbricated or twisted in æstivation, rarely sub-bilabiate or wanting; stamens as many as the corolla lobes. Capsule one-celled. Leaves exstipulate, sometimes all radical, sometimes cauline, alternate, opposite, or whorled, simple or rarely lobed (in *Hottonia*, pectinate and multifid). The species are more remarkable for their beauty than for the little economic value they possess. Most of the flowers are sweet-scented. The order comprises twenty-one genera, and about 250 species. Well-known illustrative genera are: *Androsace*, *Cyclamen*, *Lysimachia*, and *Primula*.

PRINCE ALBERT'S YEW. *See* **Saxegothea conspicua.**

FIG. 287. PRIMULA VULGARIS FLORE-PLENO, showing Habit and detached Flower.

PRINCE'S FEATHER. *See* **Amaranthus hypochondriacus.**

PRINOS. This genus is now included, by Bentham and Hooker, under **Ilex** (which *see*).

PRIONIUM (from *prionion*, a small saw; alluding to the serrated leaves). ORD. *Juncaceæ*. A monotypic genus. The species is a remarkable, greenhouse rush, found in swamps and on the banks of rivers in South Africa. In its native habitat, it often increases to such an extent as to choke the rivers in which it grows. The leaf-sheaths contain a network of strong, black fibre, suitable for brush-making; and the leaves themselves are useful for plaiting and thatching. It should be grown in a compost of loam and leaf mould, and the pot stood in a pan of water. Propagated by division.

P. Palmita (Palmiet, native name). Palmite Rush. *fl.* greenish-golden, small, similar to those of *Juncus*, sessile or very shortly pedicellate, disposed in a compound, pedunculate panicle 4ft. long. *l.* in a cluster at the top of the caudex, 2ft. to 3ft. long, linear, dilated at base into an imbricating sheath. *h.* 6ft. 1857. (B. M. 5722.)

PRISMATOCARPUS (from *prisma*, *prismatos*, a prism, and *karpos*, a fruit; alluding to the long, prismatic form of the fruit). ORD. *Campanulaceæ*. A genus comprising fifteen or sixteen species of green-

Prismatocarpus—*continued.*

house or hardy, glabrous, perennial herbs or sub-shrubs, confined to South Africa. Flowers at the tips of the branches, short, solitary or glomerate, or disposed in dichotomous, slender, slightly rigid panicles; calyx with an adnate, linear tube, and a five-cut or five-parted limb; corolla infundibuliform or broadly campanulate, five-lobed; inflorescence centrifugal. Leaves alternate, small or narrow, in the lower part of the stem, often fasciculate in the axils. For culture of *P. nitidus*—the best-known species—*see* **Campanula.** *See also* **Specularia.**

P. nitidus (shining). *fl.* white, two to four in a cluster towards the tops of the branches, sessile in the axils of the bracts, and sometimes solitary in the axils of the leaves; bracts similar to the leaves. August and September. *l.* ovate-oblong, spreading, serrated. Stem branched; branches diffuse, woody. *h.* 6in. to 12in. 1787. Greenhouse. (B. M. 2733, under name of *Campanula Prismatocarpus.*)

PRITCHARDIA (named after W. T. Pritchard, author of "Polynesian Reminiscences"). ORD. *Palmæ.*

Pritchardia—*continued.*

P. macrocarpa (large-fruited). *l.* larger than in *P. Martii*, roundish-flabellate, plicate, divided one-third the way down into numerous linear-lanceolate, acute segments. Sandwich Islands, 1879. This species somewhat resembles *P. Martii*, but is more robust in habit. (I. H. 352.)

P. Martii (Martius'). *l.* dark green, flabelliform, plaited; petioles smooth, unarmed, inclosed at the base in a few rough, brown fibres. Sandwich Islands. A species of recent introduction, quite distinct from *P. pacifica*, and having very small seeds.

P. pacifica (Pacific Islands).* *l.* of a rich dark green, large, flabellate, palmatisect, plaited, covered with white down when young; petioles clothed with a white, scaly tomentum, flat above, rounded below, inclosed at the base in a few coarse, brown fibres, and totally unarmed. *h.* 10ft. Pacific Islands, 1870. A fine species. (F. d. S. 2262-3; I. H. n. s. 161.)

P. pericularum (Dangerous Archipelago).* A handsome, fan-leaved palm, resembling *P. Vuylstekiana*, but differing in having dark brownish-golden petioles, and obliquely spherical fruit. Pomotou Islands, 1883.

P. Vuylstekiana (Vuylsteke's).* *l.* large, deep green, crowded on the young plant, which is short and thick-set. Pomotou Islands of the Dangerous Archipelago. See Fig. 288. (G. C. n. s., xix. 692.)

FIG. 288. PRITCHARDIA VUYLSTEKIANA.

A small genus (about seven species) of very ornamental, stove, unarmed palms, natives of the Friendly and Sandwich Islands. Flowers rather large, hermaphrodite, with a three-parted calyx and corolla, and six stamens; spathe ample, affixed to the peduncle, often silvery-furfuraceous; spadices long-pedunculate, about 3ft. long, with ascending branchlets. Fruit small or rather large, globose or ellipsoid, one-seeded. Leaves terminal, large, often white-furfuraceous, orbicular or cuneate at base, not deeply plicate-multifid; segments narrow, bifid at the apex, and induplicate; petioles concave; sheaths short. The species thrive best in a compost of two parts peat and one of loam and sand. A liberal supply of water is essential. Propagated by seeds only.

P. filifera (thread-bearing). A synonym of *Washingtonia filifera.*

P. Gaudichaudii (Gaudichaud's). *l.* slightly rayed, cuneate at base, the rachis extended near the middle; laciniæ nearly twenty above the middle, bifid at the apex, coriaceous-membranous, lepidoted beneath, about twelve-nerved; petioles totally unarmed. Trunk low. Sandwich Islands.

P. grandis (great). A synonym of *Licuala grandis.*

PRIVA (a name of unknown meaning, given by Adanson). SYNS. *Streptium, Tortula.* ORD. *Verbenaceæ.* A genus comprising about nine species of erect, stove or greenhouse herbs, inhabiting the warmer regions of the globe. Flowers small or mediocre, solitary at the axils of the small, narrow bracts, very shortly pedicellate; calyx ribs five, produced in short teeth, enlarged in fruit; corolla sub-bilabiate, five-lobed; spikes terminal or pedunculate in the axils, long, slender. Leaves opposite, membranous, toothed. Only one species calls for mention here. For culture, *see* **Stachytarpheta.**

P. lævis (smooth). *fl.* remotely opposite or somewhat whorled; corolla reddish, with large, rounded lobes, and a slightly villous throat; raceme terminal. Summer. *l.* ovate-oblong, cuneately attenuated into the petioles, acute or obtuse, deeply mucronate-serrate, paler and opaque beneath, rather thick. Stem erect, 1ft. to 1½ft. high, tetragonal. Argentine Republic, 1833. Greenhouse. (R. G. 1131.)

PRIVET. *See* **Ligustrum vulgare.**

PRIVET, MOCK. *See* **Phillyrea.**

PROBOSCIDEUS. Trumpet-like; proboscis-like.

PROCERUS. Very tall.

PROCESS. A term applied to any projecting appendage, whether natural or monstrous.

PROCESSION FLOWER. *See* **Polygala vulgaris.**

PROCKIA (probably commemorative, but derivation of name not given by nomenclator). SYNS. *Kellettia, Tinea, Trilix.* ORD. *Tiliaceæ.* A genus comprising only two or three species (which are, perhaps, all varieties of the one described below) of stove shrubs, natives of tropical America. Sepals three or four, valvate, persistent; petals sepaloid and persistent, sometimes absent; pedicels fasciculate or shortly racemose, terminal. Leaves ovate, serrated, many-nerved at base. *P. crucis* thrives in a compost of sandy loam and leaf mould. Propagated by cuttings of half-ripened shoots, inserted in sand, under a glass.

P. crucis (Santa Cruz). *fl.* yellow, very fragrant; corymbs few-flowered, terminal. July. *l.* ovate or cordate, acuminated, serrated, with the point entire, membranous. *h.* 5ft. West Indies, &c., 1823. (B. R. 972; L. B. C. 1933.)

PROCLESIA (a name commemorative of Procles, King of Sparta). The correct name of this genus, according to the authors of the "Genera Plantarum," is *Cavendishia.* SYN. *Polybæa.* ORD. *Vacciniaceæ.* A genus comprising about thirty species of handsome, stove, glabrous, evergreen shrubs or small trees, inhabiting the mountains of tropical America. Flowers red, scarlet, white, or flesh-colour, showy, racemose or sub-umbellate, axillary and terminal, pedicellate; calyx tube hemispherical or shortly campanulate, the limb short, dilated, five-lobed or five-toothed; corolla tubular, five-toothed, the teeth valvate; stamens ten. Leaves alternate, persistent, coriaceous, shortly petiolate, entire. The two best-known species are here described. Both are shrubs. For culture, *see* **Thibaudia.**

P. acuminata (taper-pointed).* *fl.* in short racemes, covered, when in bud, by large, scarlet bracts; corolla bright red, with green tips and lobes, ⅔in. long. November. *l.* sub-distichous, on very short, stout petioles, 2in. to 3in. long, ovate or oblong-lanceolate, rounded at base, with long-acuminate or caudate points. Branches pendulous, slightly glabrous or pubescent. Andes of Columbia and Ecuador, 1868. SYN. *Thibaudia acuminata* (B. M. 5752). The correct name of this plant is *Cavendishia acuminata.*

P. cordifolia (heart-shape-leaved). *fl.*, corolla bright red, white at the mouth, tubular-ventricose, nearly 1in. long; racemes reduced to a crowded head. December. *l.* 1½in. to 3in. long, ovate-oblong, obtuse, quite entire, cordate at base; petioles very short, pubescent. Branches terete, pubescent. New Grenada and Ecuador, 1865. SYN. *Thibaudia cordifolia* (B. M. 5559). The correct name of this plant is *Cavendishia cordifolia.*

PROCUMBENT. Lying flat upon the ground.

PROFEREA. Included under *Nephrodium.*

PROIPHYS. A synonym of *Eurycles.*

PROLIFEROUS. *See* **Prolification.**

PROLIFICATION (from *proles*, offspring, and *facio*, I make). A term denoting, in its widest sense, the reproduction of plants by means of buds, as opposed to reproduction by means of seeds. It is accordingly employed to denote the formation in many plants, *e.g.*, the Houseleek (*Sempervivum tectorum*), of offsets or stolons, of which the terminal bud becomes a new plant, and the connection with the parent is severed. It is also employed in cases where buds are formed along the edges of leaves, either on uninjured ones (*e.g.*, *Bryophyllum* and *Malaxis*), or in those that have been injured or cut, as in propagating Begonias from the leaves.

The word is, however, frequently restricted to denote certain alterations that are often met with in the inflorescences and flowers of cultivated plants, in which leaf or flower-buds are produced where they do not

naturally occur. If Prolification affects the inflorescence, it consists in the formation of leaf-buds, or of an unusual number of flower-buds. It is often well seen in such plants as Clovers and Plantains, in which the flowers are arranged naturally in a close head or spike. The

FIG. 289. HEN-AND-CHICKENS DAISY, showing Prolification of the Inflorescence.

Hen-and-Chickens Daisy (see Fig. 289), in which the flower-head bears a number of smaller ones around it, is a well-known example of Prolification of the inflorescence. When a single flower is affected, the flower-stalk may be prolonged through and beyond the flower, and may bear leaves or a flower-bud on it. This form of Prolification, known as "median," is occasionally seen in many plants, *e.g.*, the Rose. It is peculiarly frequent in double flowers, *i.e.*, flowers in which the stamens have been replaced by petals. Occasionally, the prolonged flower-stalk bears several leaf-buds or flower-buds. Another form of Prolification, called "axillary," consists in the growth of leaf-buds, or of flower-buds, from the axils of one or more of the parts of a flower. In this form, as in the last, the buds may develop into branches bearing several flowers. Such buds are most frequently situated in the axils of sepals. Next in frequency are those in the axils of leaf-like carpels; less often they are associated with petals; and least common is their occurrence in the axils of stamens. Axillary Prolification is far more frequent in plants in which all parts of the flowers are free, than in those in which they are united; and the flowers most liable to it generally have the top of the flower-stalk, or receptacle, naturally prolonged between the whorls of the flower, or possessed of a glandular disk, or are otherwise peculiar in structure. Those desirous of further information on this subject will find it fully discussed in Dr. Masters' "Vegetable Teratology," published, in 1869, by the Ray Society.

PROMENÆA. Included under **Zygopetalum** (which *see*).

PRONAYA (named in honour of Lad. Pronay, a Hungarian naturalist, who died in 1808). SYNS. *Campylanthera, Spiranthrea* (of Hooker). ORD. *Pittosporeæ.* According to Bentham, in his "Flora Australiensis," this genus is monotypic. The species, *P. elegans*, is an elegant, greenhouse twiner, succeeding in sandy peat. Propagation is effected by cuttings, made of young shooots, and inserted in sand, under a glass.

P. elegans (elegant). *fl.* bluish or white, in a dense, terminal corymb, sessile amongst the last leaves. August. *l.*, lower ones often coarsely toothed or lobed, the others sessile or nearly so, lanceolate or linear-lanceolate, 1in. to 1½in. long, entire, rather firm; margins recurved. Australia, 1857. (P. M. B. xii., 99.) SYNS. *Campylanthera Fraseri, Spiranthera Fraseri.*

PRONE. Lying flat, particularly face downwards.

PROPAGATION. Any method by which plants can be increased in quantity, however slow the process may be, is rightly referred to as being applicable for the purpose of Propagation. Plants are propagated in various ways: some which increase at a most rapid rate by one method cannot be similarly raised by another; occasionally, they cannot be raised at all. The principal modes are those of seeds, cuttings, layers, offsets, bulbs, tubers, suckers, runners, and division of the plant or rootstock. Budding and grafting afford facilities for the rapid Propagation of such plants as under certain conditions may be successfully dealt with; and sometimes leaves are inserted, with the result that new plants or bulbs will eventually form on the firm parts of the main midribs where incisions have been made. Under **Budding, Cuttings, Grafting, Layering,** and **Leaf Propagation,** details may be found of the ways in which these several systems of Propagation are adopted in practice, which it is unnecessary to repeat under this heading.

Propagation by seeds is the most natural mode, and is, consequently, the one by which the vast majority of plants naturally spread and reproduce their species more or less true, according as the flowers are subjected or disposed to become influenced by foreign pollen affecting their fertilisation. If all plants were naturally to reproduce themselves true from seeds, the endless variety represented, for instance, in florists' flowers, could not possibly have been obtained by artificial fertilising and cross-breeding, neither could further improvements be so rapidly made. Where exact counterparts of plants cannot be insured by seed-saving, there is generally some one or more of the other methods of Propagation which can be successfully applied, as the insertion of cuttings, buds, or grafts, which generally retain their distinctive characters, although often—as in budding and grafting—supported by sap which is not that of a plant or tree of the same species, nor, maybe, even of the same genus. The great number of annuals in cultivation must of necessity be propagated from seeds, as their roots do not live long after the seed comes to maturity. The conditions requisite for successful Propagation by seeds, are the proper ripening beforehand of the latter, their right preservation during the interval between collecting and sowing, so as to insure the retention of all germinative properties, and their insertion in soil at the proper time, under conditions favourable to rapid or slow development into plants, as individual sorts may be naturally disposed. Some seeds, even when perfectly matured, retain their germinative properties but a comparatively short time; while others, kept under favourable conditions, are just as good at the end of four, or frequently more, years, as in the first after being gathered. When old seeds of flower or kitchen garden crops are intended for sowing, a few of each should be tested beforehand, in order to ascertain the proportion of good ones in a given quantity. This may easily be done, by sowing a potful, and placing them in a little heat. A seed-room kept at about 45deg., and not much affected by outside fluctuations of temperature, is best suited for the general preservation of seeds, from the time of collecting them until the period for sowing; it should have a boarded floor, and be kept quite dry. There are, however, many seeds, especially those of trees, which lose their vitality if kept dry; these should be placed in sand, soil, damp moss, or some other substance suitable for preserving them, until the proper time for sowing arrives. This varies considerably with different plants, and as those raised from seed are extremely numerous, it is impossible to refer to them in more than limited and very general terms. One of the chief considerations is that of sowing so that the young plants shall appear above ground at a season suitable to their after-development. Tender annuals, that will not withstand cold weather,

Propagation—*continued.*

must be sown in spring; hardy ones sometimes succeed and flower all the better if they are established by that season. Seeds of plants that are biennial—that is, do not flower until the second year—require sowing before, or soon after, midsummer, a season favourable to germination, and one which allows the plants, when obtained, to become established before the winter. There are numerous plants grown from seed for indoor decoration, the season for sowing which depends very much on the time when the product is required. Gardening supplies are in constant demand, and sowing for succession is one of the gardener's chief considerations, as it affects so seriously his system adopted for providing what is requisite at the proper time. There are various methods of seed-sowing, but in the open ground they may practically be reduced to two, namely, scattering indiscriminately or broadcast, and sowing in drills. The last-named is the one now most generally practised, as it affords more convenient opportunities for cleaning and thinning the crops or seedlings, as the case may be, than the broadcast system does. Under glass, shallow pans are perhaps most suitable; they afford a larger top surface than pots, and this is often desirable for enabling one to sow thinly. Whether pans or pots are used, they should always be thoroughly clean and dry, and be well drained. Seeds of any description may be said to require a lighter soil wherein to germinate than that in which the plants will grow when established. Even those of forest-trees, which fall and root themselves into the earth, are naturally provided with a covering of leaf-soil formed by the decay of the leaves which the trees themselves shed. Encouragement to free root action is first essential, and this is usually best given by the use of a light compost, into which the roots can readily enter; any special requirements can be provided when they are stronger, and when nutriment is necessary to assist in building up the plant's tissues. A rule which is sometimes adopted, and which is not altogether to be considered inapplicable at any time, is that of covering seeds, when sowing, with an amount of soil about equal to their own depth. If the seeds were very small, and covered deep with soil, in all probability, the plants would perish before reaching the surface; large seeds, which are generally of a much stronger constitution, are more likely to succeed. It is, however, noticeable that some large trees have comparatively minute seeds, which require very careful treatment when young specimens are being raised.

Passing on to refer briefly to the other methods of Propagation enumerated, cuttings are perhaps the most useful. Nearly all soft-wooded plants are readily increased by them, and a very large proportion of hard-wooded ones that are not entirely limited to being increased from seeds. Cuttings require to be of different degrees of firmness. A proper knowledge of various plants must be acquired from experience before successful propagating can be practised. Some cuttings emit roots from almost any part of the stem, while others need a joint or heel, and preparation of an exact nature, to insure the emission of roots. Offsets, tubers, bulbs, and corms, are formed, in some cases, on the stems of plants which bear them, but more generally about their roots. Where they are produced, an easy mode of Propagation is effected by separating or lifting them when the old plants ripen and their tops decay. Tubers admit of being cut into several pieces, each of which will eventually form another plant if it is provided with a perfect eye or bud that can be preserved from injury after being planted; the Potato is a well-known example of this. Corms of the Crocus will also be familiar; they are formed in quantity round the old one, and should be taken up and replanted separately each year. Propagation from suckers is a simple pro-

Propagation—*continued.*

ceeding; it consists in taking up the sucker, with all its roots, and replanting it at any time when the parent plant or tree may also be safely removed. Suckers are not always to be favoured; they are inclined to similarly reproduce themselves, and rob sap which should proceed to the one main stem. Such things as Filberts, Lilacs, Raspberries, &c., may, however, be propagated from suckers; and for an example of plants in pots which may be similarly increased, Chrysanthemums may be cited. Runners proceed along the ground, and form small plants, which are first nourished by the parent, but afterwards root and support themselves. Varieties of Strawberries are almost exclusively propagated by runners, and there are several other examples. Propagation by division is generally understood to mean the parting of the rootstock of a plant and inserting the pieces thus obtained with roots, to form separate plants. It is a very important method, often available when many of the others are impracticable, or employed with difficulty or uncertainty.

PROPAGINES. Bulblets formed on the stems of some plants.

PROPENDENT. Hanging forwards and downwards.

PROPHYLLA. Primary leaves.

PROSAPTIA. Included under **Davallia** (which *see*).

PROSARTES. Included under **Disporum** (which *see*).

PROSELIA. Included under *Chætanthera*.

PROSERPINACA (an old Latin name, used by Pliny, probably from *proserpo*, to creep; in reference to the creeping stems). Mermaid Weed. SYN. *Trixis*. ORD. *Haloragеæ*. A genus comprising a couple of species of hardy, aquatic herbs, inhabiting North America and the West Indies. Flowers minute, axillary, sessile, solitary or clustered. Leaves alternate, sub-sessile, lanceolate, dentate or pectinate-pinnatifid. Stems creeping at the base. The species should be grown in large pans of water, with a little soil for the roots to run in; or they may be cultivated in ponds. They require shelter during winter.

P. palustris (marsh-loving). *fl.* white. Summer. *l.* lanceolate, sharply serrate, the lower pectinate when under water. Canada, &c., 1818.

P. pectinacea (pectinate). *fl.* white. Summer. *l.* all pectinate, the division linear-awl-shaped. North America, &c., 1821.

PROSOPIS (an old Greek name used by Dioscorides for the Butter-bur). Including *Algarobia*. ORD. *Leguminosæ*. This genus comprises about eighteen species of trees or shrubs, often armed with hooked prickles or stout, axillary spines, or with both, dispersed through the tropical and sub-tropical regions. Flowers small, in cylindrical spikes, or rarely in globose heads; calyx campanulate, shortly dentate; petals valvate. Leaves bipinnate, generally rigid, and of a glaucous hue, with only one or two pairs of pinnæ, but with a considerable number of leaflets. The species are very rarely seen in cultivation, with the exception of *P. siliquastrum*, a nearly hardy tree, which thrives in sandy loam. Propagation is effected by rather firm young shoots, taken off close to the older stems, and inserted in sand, under a glass, in gentle heat.

P. siliquastrum (Siliqua-podded). *fl.* white. *l.* with two or three pairs of pinnæ, each pinna having numerous pairs of linear, obtuse leaflets. Spines stipular, twin, straight. *h.* 30ft. to 40ft. Chili, 1827.

PROSTANTHERA (from *prostithemi*, to append, and *anthera*, an anther; alluding to the connectives of the anthers being spurred beneath). Australian Mint-bush or Mint-tree. Including *Chilodia*. ORD. *Labiatæ*.

Prostanthera—*continued.*

An Australian genus comprising thirty-eight species of greenhouse shrubs or under-shrubs, studded with resinous glands, and usually strongly scented. Flowers generally white or red, shortly stalked, with a pair of bracteoles close under the calyx; calyx campanulate, the limb of two broad, entire lips; corolla tube short, dilated into a broad, campanulate throat, the upper lip of the limb broadly two-lobed, the lower three-lobed; whorls two-flowered, axillary or disposed in a terminal raceme. Nutlets ovoid, reticulately wrinkled. Leaves entire or toothed, often rather small, the upper ones conformed or reduced to deciduous bracts. The species best known, and most worth growing, are the under-mentioned. They are all shrubs. A sandy-peat soil suits them best. Plenty of drainage is at all times essential. Propagated by cuttings of the young shoots.

P. cuneata (wedge-leaved). *fl.* all axillary, but sometimes crowded into terminal, leafy racemes; corolla white, with purple spots, twice as long as the calyx. June. *l.* sessile or nearly so, often crowded on the short branchlets, obovate-cuneate or almost orbicular, obtuse, entire or crenate, the margins often slightly revolute. *h.* 2ft.

P. empetrifolia (Empetrum-leaved). *fl.* axillary; corolla violet, fully twice as long as the calyx. September. *l.* sessile, linear, acute, entire, with revolute margins, rarely above ½in. long. *h.* 2ft. 1829. (B. M. 3405, under name of *Chilodia scutellarioides*.)

P. lasianthos (woolly-flowered). Victorian Dogwood. *fl.* white, tinged with red, hairy, opposite, in pairs; throat of corolla spotted with red inside; pedicels short; racemes panicled. June. *l.* petiolate, usually oblong-lanceolate, rather acute, dentately serrated, 2in. to 3in. long. Branches nearly glabrous. *h.* 3ft. to 6ft. 1808. This species proves nearly hardy in favoured spots, and when grown against a wall. (A. B. R. 641; B. M. 2434; B. R. 143.)

P. nivea (snowy).* *fl.* snow-white, or tinged with pale blue, rather large, axillary, the upper ones forming terminal, leafy racemes; corolla twice as long as the calyx. *l.* sessile, linear-terete, with incurved or involute margins, or flat when fresh, acute or obtuse, rather slender, mostly ¼in. to 1in. long, the upper floral ones smaller. *h.* 3ft. to 6ft. 1866. A beautiful species. (B. M. 5658.)

P. rotundifolia (round-leaved). *fl.* purple, in short, close, terminal racemes, the lower ones sometimes in the axils of the leaves, like the stem ones. July. *l.* broadly ovate-orbicular or spathulate, on rather long petioles, very obtuse, entire or slightly crenulate, all less than ½in., and sometimes under ¼in., long. *h.* 3ft. 1824.

P. violacea (violet).* *fl.* usually bluish-purple, in two or three pairs, forming small, terminal, compact racemes; corolla not twice as long as the calyx, and sometimes scarcely exceeding it. June. *l.* very small, shortly but distinctly petiolate, broadly ovate or orbicular, more or less crenate, with revolute margins, rarely exceeding two lines, and often not more than one line, long. *h.* 4ft. 1820. (B. R. 1072.)

PROTANDROUS. *See* **Proterandrous.**

PROTEA (from *Proteus*, the versatile sea-god; in allusion to the diversity of the species). SYNS. *Erodendron, Leucadendron* (of Linnæus), *Pleuranthe*. ORD. *Proteaceæ*. A genus comprising about sixty species of magnificent, greenhouse shrubs or small trees, almost all natives of extra-tropical South Africa, one or two extending in tropical Africa as far as Abyssinia. Flowers solitary, densely capitate, surrounded sometimes by coloured bracts; heads usually large, globose or rarely oblong, cone-like; receptacle thick, flat or convex; involucral scales numerous, imbricated, or the lower ones sometimes elongated, blackish or coloured. Leaves alternate or scattered, coriaceous, rigid, entire, very variable in shape. Many of the species have been introduced to cultivation, but are now only rarely met with. They require an airy greenhouse, with exposure to full sunlight: during summer, they should be placed out of doors. Most of them thrive only in well-drained, sandy peat, and they are induced to flower freely by allowing them to become pot-bound after they have grown to the required size. Some form large shrubs, and flower on the ends of the branches; while others are dwarf and trailing, and the flowers are produced on the old stem, close to the ground. Propagated by cuttings of the half-ripened young wood, inserted in sandy peat, under a bell-

Protea—*continued.*

glass; or by imported seeds. Several of the species formerly included here will now be found under **Serruria** (which *see*).

P. acaulis (stemless). *fl.* purple, in a sessile, hemispherical head, 1in. to 1½in. in diameter. July. *l.* obovate-oblong, thick, 4in. to 8in. long, 1in. to 2in. broad, obtuse or mucronate-acute, narrow-cuneate below the middle, sometimes petioliform at base. Stem shortened and much branched, depressed. *h.* 1½ft. 1802. (B. M. 2065.)

P. acerosa (acerose). *fl.* blackish, in somewhat aggregate, subsessile, turbinate-hemispherical heads, 1in. in diameter; perianth scarcely ¼in. long. April. *l.* subulate, slender, somewhat rigid, smooth, seven to twelve lines long, scarcely half a line broad. Stems erect, nearly 1ft. high, sub-umbellately branched. 1803. This species may be readily recognised by the leaves being more slender than the style. (B. R. 351.)

P. angustifolia (narrow-leaved). A form of *P. grandiflora*.

P. cordata (heart-shaped).* *fl.* purple, in a hemispherical head as large as a small apple; scales red, obtuse; perianth ½in. long. April. *l.* remote, glaucous, sessile, cordate, and somewhat rounded or ovate, rigid, 2in. to 4in. long, 1½in. to 5in. broad; young ones red-margined. Stem prostrate, short, scaly; branches slender, ascendent. *h.* 3in. to 12in. 1790. (A. B. R. 289.) SYN. *P. cordifolia* (B. M. 649).

P. cordifolia (heart-shape leaved). A synonym of *P. cordata*.

P. coronata (crowned). A synonym of *P. formosa*.

P. cynaroides glabrata (Cynara-like, glabrous).* *fl.* white, greenish within, in large, obovate-globose, at length spreading heads; scales rosy-tipped. August. *l.* elliptic or oval-oblong, attenuated at both ends, usually obtuse. Stems epigæous, 6in. to 12in. long, very simple, thick. 1774. (A. B. R. 288, under name of *P. cynaroides*.)

P. c. obtusifolia (obtuse-leaved). *fl.* like those of the type. *l.* sub-orbicular or obovate, very obtuse, shortly attenuated at base or sub-emarginate, together with the petiole 4in. to 6in. long, 1in. to 2in. broad. (B. M. 770, under name of *P. cynaroides*.)

P. formosa (beautiful).* *fl.*, perianth violet; involucre of an intense rose-colour, the scales white-ciliated. May. *l.* narrow-oblong, oblique, glaucescent, 3in. to 4in. long, 1½in. to 2in. broad, slightly obtuse, rose-margined, glabrous. Branches, as well as the margins of the leaves, tomentose. *h.* 6ft. 1789. (B. M. 1713.) SYN. *P. coronata* (A. B. R. 469).

P. formosa (beautiful), of Andrews. A synonym of *Leucospermum medium*.

P. grandiflora (large-flowered). *fl.* white, in heads as large as a man's fist; calyx ¾in. long; style at length 3in. long, straight; young scales ferruginous- or white-tomentose. May. *l.* oblong, obtuse, reticulate-veined, not marginate, 3in. to 5in. long, from 1in. to 2in. broad, coriaceous, with a terminal, obtuse or sub-recurved callus. Branches glabrous, densely leafy. *h.* 6ft. to 7ft. 1787. A small tree. (B. M. 2447.) *P. angustifolia* (B. R. 569), according to Meissner, is a mere form of this, with lanceolate leaves, six to eight lines broad.

P. lævis (smooth). *fl.* greenish, nearly 1in. long, in sessile, mediocre, erect, hemispherical heads; scales sub-sericeous, at length glabrous. May. *l.* glaucous, elongated-linear, acute, glabrous, attenuated at base, flat, secund, 4in. to 6in. long. Stem decumbent, dwarf. 1806. (B. M. 2439.)

P. latifolia (broad-leaved). *fl.* purple, scarlet, or green, as much as 3½in. long, tomentose, in large, turbinate heads. August. *l.* sessile, cordate-ovate, obtuse, reticulate-nerved, 3in. to 4in. long, 2in. to 3in. broad, thick, amplexicaul, the margins sometimes woolly. Branches tomentose, densely leafy at apex. *h.* 6ft. to 8ft. 1806. (B. M. 1717.) SYN. *P. radiata* (A. B. R. 646).

P. lepidocarpon (scaly-fruited). *fl.* purple, in ovoid, sessile heads, about the size of the fist; perianth nearly 2in. long, pilose. May. *l.* lanceolate, acute, narrow at base, slightly scabrous-dotted, rigid, erect, 3in. to 5in. long, five to seven lines broad. Branches glabrous, or the younger ones tomentose or sub-villous. *h.* 6ft. 1806. Shrub or small tree. (A. B. R. 301, under name of *P. grandiflora* var.)

P. lepidocarpon (scaly-fruited), of Ker. A synonym of *P. melaleuca*.

P. longifolia (long-leaved). *fl.* pale, blackish at the tips of the perianth, 4in. long, pilose, in large, ovate-oblong heads, very shortly turbinate at base. February. *l.* narrow-lanceolate, long-attenuated, 3in. to 6in. long, three to four lines broad, acute or obtuse, or callous-apiculate. *h.* 2ft. 1798. (A. B. R. 132-134; B. R. 47.)

P. magnifica (magnificent). A synonym of *P. speciosa*.

P. melaleuca (black-and-white). *fl.*, involucral scales white-ciliated, outer ones squarrose, inner ones connivent, black-tomentose at back. May. *l.* linear-ligulate, ciliated on the margins. Branches slightly pilose. *h.* 6ft. 1786. SYNS. *P. lepidocarpon* (B. M. 674), *P. speciosa nigra* (A. B. R. 103).

P. mellifera (honey-bearing).* Cape Honey-flower, or Sugar-bush. *fl.* pink or white, 3in. to 3½in. long, white-penicillate at the tips, in large, ovate-oblong, attenuated, sub-pedunculate

Protea—*continued.*

heads, 3in. to 4in. long; scales of a beautiful sanguinary-rose colour, slenderly striated. September. *l.* lanceolate, of a pleasing green, 3in. to 5in. long, three to six lines broad, by no means marginate, slightly callous-apiculate. Branches spreading, ascendent at apex. *h.* 6ft. 1774. Shrub or small tree. (A. B. R. 582; B. M. 346.)

P. mucronifolia (mucronate-leaved). *fl.* violet, white within, and white-bearded, less than 1in. long, in small, globose, subsessile heads, about the size of a walnut. September. *l.* linear, 1½in. to 2in. long, with a pungent mucrone, not narrowed at the base. Branches glabrous. *h.* 4ft. 1803. (A. B. R. 500; B. M. 933.)

P. neriifolia (Oleander-leaved). *fl.* purplish and yellowish-white, plumose at the tips, in oblong-turbinate heads, 3in. long; inner scales silvery-silky, black-bearded on the margins. March. *l.* linear-lingulate, 4in. or more long, about ¾in. broad, obtuse or very slightly acuminate, emarginate at base, and, as well as the branches, tomentose. *h.* 3ft. or more. 1806. A robust shrub. (B. R. 208.)

P. penicillata (pencilled). *fl.* 1½in. to 1¾in. long, white-bearded at the apex, in a turbinate, spheroid head, as large as an apple; style 2½in. long, sulcate. Summer. *l.* lanceolate, slightly obtuse at both ends, 2in. to 3in. long, six to ten lines broad, the young ones villous-ciliated. Branches slender, rather loosely leafy, tomentose at the top. Shrub. (B. M. 6558.)

P. pulchella (pretty).* *fl.* red; inner involucral scales silky, black-bearded on the margins. June. *l.* linear-lingulate, rather blackish on the margins, slightly scabrous. *h.* 3ft. 1795. (A. B. R. 270; B. R. 20.)

P. radiata (rayed). A synonym of *P. latifolia*.

P. Scolymus (Scolymus).* *fl.* purple, ½in. to ¾in. long, in sessile, erect heads, as large as a plum, at length obovate; style 1in. long, rather thick. April. *l.* linear-lanceolate, acute, long-attenuated at base, 2in. to 4in. long, ⅛in. to ¼in. broad, striate-wrinkled, and, as well as the branches, glabrous. Branchlets slender, corymbose, rather loosely leafy. *h.* 3ft. 1780. An erect shrub. (A. B. R. 409; B. M. 698.)

P. speciosa (showy). *fl.* 3in. long, white-silky, the laminæ sometimes red- or white-bearded; heads ovoid, as large as the fist; scales all white-silky. April. *l.* thick, oblong or obovate, narrowed at base, somewhat acutely mucronate, 3in. to 6in. long, 1in. to 2in. broad, and, as well as the erect branches, glabrous. *h.* 6ft. 1786. Shrub or small tree. (A. B. R. 110; B. M. 1183.) SYN. *P. magnifica* (A. B. R. 438).

P. s. nigra (black). A synonym of *P. melaleuca*.

P. villifera (villi-bearing). *fl.* purple, in sessile, oblong heads, 3in. long and 1in. to 2in. broad; inner scales pink, white-bearded at apex. August. *l.* sessile, glaucous, obovate-oblong, obtuse, attenuated at base, 3in. long, 1in. to 2in. broad, and, together with the branches, pilose. *h.* 6ft. 1800. (B. R. 1023.)

PROTEACEÆ. A natural order of trees or shrubs, rarely perennial herbs, mostly Australian or South African, a few being dispersed in tropical or extra-tropical South America and the South Pacific Islands; they are wholly wanting in North temperate regions. Flowers hermaphrodite, or by abortion polygamous or dicœcious, capitate-spicate, racemose, or rarely solitary, bracteate, very rarely bibracteolate; perianth inferior, of four at first valvate, coherent segments, afterwards becoming more or less recurved; stamens four, always shorter than the perianth; anthers erect, in hermaphrodite flowers all perfect or rarely one abortive, the connective continuous with the filaments; bracts sometimes small, very caducous, or almost obsolete, sometimes imbricating and persistent, forming a hard cone. Fruit very variable in form. Leaves alternate or scattered, rarely opposite or whorled, entire, much toothed, or sometimes pinnatisect or decompound on the same plant, usually coriaceous; stipules none. Many of the species are well known to gardeners, by whom they have long been cultivated. Several produce an abundance of nectar. The wood of some of the Australian kinds is valuable for cabinet-making. *Proteaceæ* comprises forty-nine genera and about 950 species. Well-known examples are: *Banksia*, *Grevillea*, *Hakea*, *Leucospermum*, and *Protea*.

PROTEINOPHALLUS. Included under *Amorphophallus*.

PROTERANDROUS and **PROTANDROUS** (from the Greek words *proteros*, sooner, and *aner*, *andros*, a male). Words devised, by Delpino and by Hildebrand respectively, to signify that, in a flower which possesses both stamens and pistil, the pollen is

Proterandrous and **Protandrous**—*continued.*

ripe before the stigma of the flower is ready to receive it. This is one of the most frequent adaptations to favour cross-fertilisation in plants, since the pollen of a Proterandrous flower is frequently removed by wind or insects before the stigma is ready for its reception; hence, pollen must be brought to the stigma from a younger flower.

PROTEROGYNOUS and **PROTOGYNOUS** (from *proteros*, sooner, and *gyne*, a female). Terms used, by Delpino and by Hildebrand respectively, to denote a hermaphrodite flower in which the stigma is ready to receive pollen before that in the same flower is ripe. In Proterogynous flowers, the stigma is pollinated from an older flower, and may be withered, or may have fallen off, before the anthers in its own flower have burst to shed the pollen. Proterogyny is not frequent. The common Pellitory (*Parietaria officinalis*) affords an example.

PROTHALLUS, or **PROTHALLIUM** (from the Greek words *pro*, instead of, and *thallos*, a branch; in reference to the structure thus named taking the place of a stem). The body which is developed from a spore of a Fern, Horsetail, Club-moss, or Pillwort. It varies much, in these four groups, in its degree of development, and in its form; but, in all cases, it is entirely cellular throughout its existence, and on it are formed the organs for sexual reproduction. In Ferns, the male and the female organs are present in the same Prothallus; in most plants of the other groups, the Prothallus bears only male or only female organs. There is a distinct alternation of generations in plants that produce a Prothallus, *i.e.*, in the higher Cryptogams. The spore produces the Prothallus (see Fig. 290), on which are formed the sexual organs, the male being the antheridia, with antherozoa, and the female being the archegonia, in each of which lies the oosphere, which, fertilised by antherozoa, becomes the oospore. This develops into the Fern-plant bearing the well-known fronds, on the back of which are visible the groups (sori) of minute, brown spore-cases (sporangia), in which lie numerous spores, like the one with which the cycle began. The spores are formed by vegetative growth, not by sexual reproduction. It will thus be seen that the Prothallus and the leafy Fern-plant are two generations in the course of a single cycle. The Prothallus of Ferns (except in the Moonwort group) is a flattened, green, expanded body, which grows in damp places, *e.g.*, on damp bricks. It is thin, and consists of a single layer

FIG. 290. YOUNG PROTHALLUS, much enlarged—*p*, Prothallus; *rh*, Root-hairs of Prothallus; *s*, Spore.

FIG. 291. LOWER SURFACE OF MATURE PROTHALLUS, much magnified—*a*, Archegonia; *rh*, Root-hairs.

Prothallus, or **Prothallium**—*continued.*

of cells, except in the middle, where it reaches a thickness of several layers. The cells contain an abundant supply of chlorophyll bodies, which give the Prothallus its colour. In general outline, the Prothallus, when full-grown, usually resembles the conventional figure of a heart, having one end narrowed, and a notch in the broader margin (see Fig. 291). It seldom exceeds ¼in. in breadth. On the lower surface are numerous root-hairs, each made up of a row of cells. On the lower surface also, and along the edges, are formed the antheridia. The archegonia are situated in the middle of the lower surface. The antheridia originate as outgrowths of cells of the epidermis; each outgrowth is cut off, as a new cell, by a cell wall. In some Prothalli, the contents of the cell thus formed break up into a number of small, rounded cells, called "parent cells." In each of these there is formed an antherozoid, slender, but coiled spirally in two or three turns, and provided

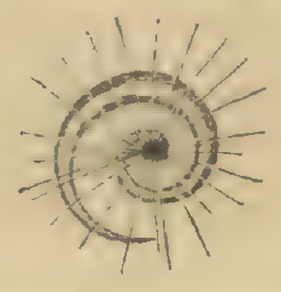

FIG. 292. ANTHEROZOID, much magnified.

with a tuft of fine hairs, or cilia, at one end (see Fig. 292). In most Prothalli, however, a process of cell-division goes on in the young antheridium, whereby it is finally made up of a layer of cells surrounding

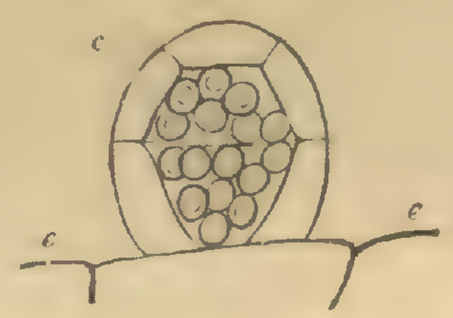

FIG. 293. YOUNG ANTHERIDIUM, much magnified—*c*, Central Cell, filled with Parent Cells of Antherozoids; *e*, *e*, Epidermis of Prothallus.

a central cell (see Fig. 293), and, in this latter, the parent cells are developed, and produce antherozoids. The outer coat, formed by the layer of cells, has to aid in expelling the antherozoids when ripe, and the cells do this by absorbing water rapidly, swelling, and compressing the contents of the central cell till its apex,

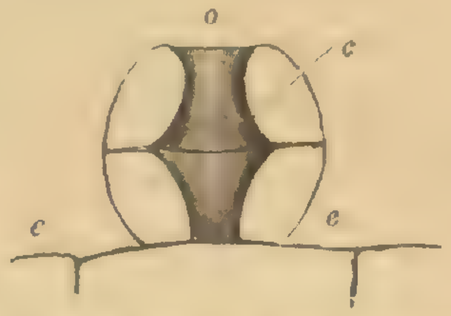

FIG. 294. RIPE ANTHERIDIUM (much magnified), from which Antherozoids have been shed by opening at *o*—*c*, Empty Central Cell; *e*, *e*, Epidermis.

which is not covered by the layer, is burst (see Fig. 294), and the "parent cells" are expelled, and, soon rupturing, set free the antherozoids. The latter move about actively in water, *e.g.*, in a drop of dew or of rain.

The archegonia are situated on the lower surface, behind the notch already mentioned (see Fig. 291). Each originates, like the antheridia, from a cell of the epidermis, from which it grows out, in a hemispherical form. A cell wall forms, and cuts it off from the cell of the epidermis. It increases in size, and becomes further divided into three layers; and these are again

Prothallus, or **Prothallium**—*continued.*

sub-divided by cell walls. The result is that a structure is formed in the shape of a flask with a long, narrow neck. The hollow of the flask is occupied by a large

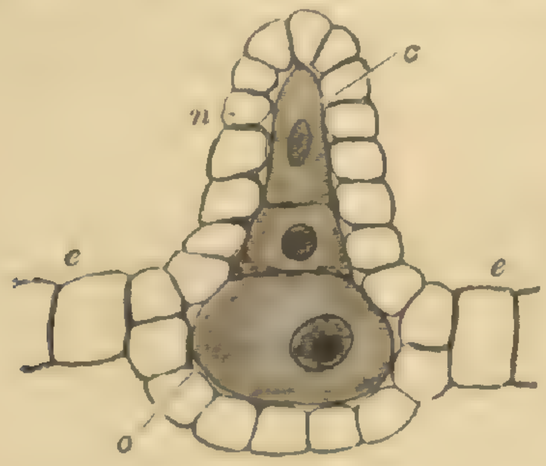

FIG. 295. IMMATURE ARCHEGONIUM, much magnified, —*n*, Neck-cells; *c*, Canal, still closed above, and filled by the Canal-cell; *o*, Oosphere; *e*, *e*, Epidermis of Prothallus.

cell, the oosphere, rich in protoplasm (see Fig. 295). The tube of the neck is at first filled with a narrow cell, the canal-cell, the cell wall of which becomes mucilaginous, swells, and is expelled from the outer opening of the tube, leaving a passage for the antherozoid down the tube to the oosphere, when the latter is ripe to be

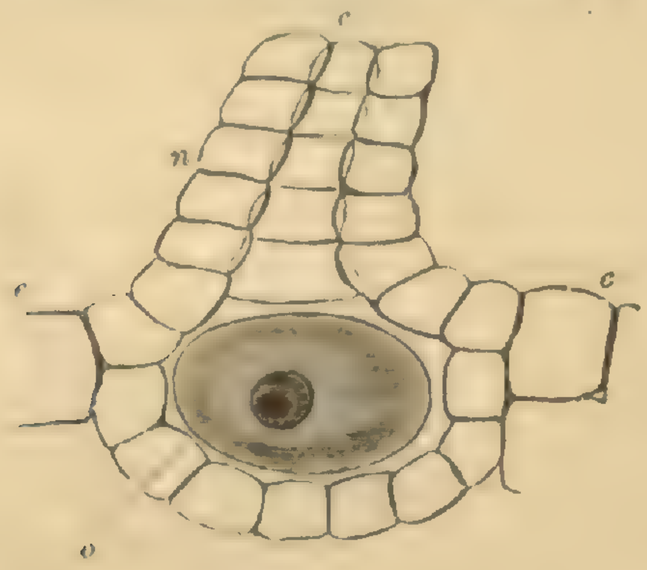

FIG. 296. LONGITUDINAL SECTION OF MATURE ARCHEGONIUM OF FERN, much magnified—*n*, Neck-cells; *c*, Opening of Canal down neck; *o*, Oosphere; *e*, *e*, Epidermis of Prothallus.

acted on by it (see Fig. 296). The antherozoids are caught in the mucilage while moving over the moist Prothallus; they wriggle down the tube, reach the oosphere, and fertilise it. The latter very soon begins to grow; and the final result is the development of the oospore into the leafy plant or Fern. It may be mentioned that the

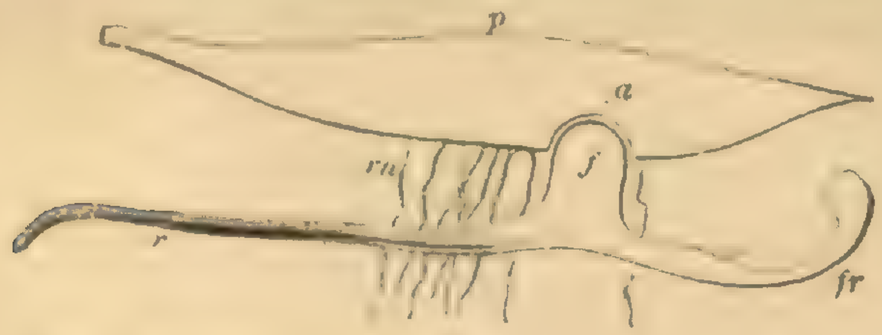

FIG. 297. DIAGRAMMATIC SKETCH OF CONNECTION OF YOUNG FERN WITH PROTHALLUS—*p*, Prothallus; *rh*, Root-hairs of Prothallus; *f*, Foot of Young Fern, imbedded in hollow of enlarged Archegonium, *a*; *fr*, Very Young Frond of Fern; *r*, Root of Fern.

oospore, at a very early period, divides into eight cells, in two layers. Of these cells, four lie next the base, and four next the front margin of the Prothallus. Of the latter, the two farthest from the neck of the archegonium give origin to the first leaf or frond; one, near the neck, to the growing point of the stem; and the fourth to hairs. Of the other four cells, one, opposite to the stem, develops into the root, one ultimately disappears, and the other two form the "foot," a structure that remains sunk in the archegonium, which has grown so as still to surround the foot (see Figs. 297 and 298). By means of this

Prothallus, or **Prothallium**—*continued.*

organ, the young plant absorbs nourishment from the Prothallus, which, for a time, increases in size, but is gradually used up, and withers away, and afterwards the young Fern is able to nourish itself by its own roots and leaves.

FIG. 298. YOUNG FERN GROWING FROM PROTHALLUS, slightly enlarged—*p*, Lower Surface of Prothallus; *rh*, Root-hairs of Prothallus; *fr*, Young Frond of Fern; *r*, Root of Fern.

Two departures from this mode of reproduction have been detected in Ferns within recent years. The one of these, called "apogamy" (from *apo*, afar, and *gamos*, marriage) by Professor de Bary, was detected, in *Pteris cretica*, by Professor Farlow, and is now known to occur in a few other Ferns, including *Nephrodium Filix-mas cristatum*. In this process, the young Fern is produced as a bud from certain parts of the Prothallus, without the formation of sexual organs. The sexual process in this case is abolished, as the name indicates.

In 1884, Mr. Druery stated, in the Linnæan Society, the discovery that, in certain Ferns, the Prothalli are produced as outgrowths from the pinnules of the Fern fronds, and not from the spores. This process has been called "apospory" (from *apo*, afar, and *spora*, a spore or seed). It has been investigated and described by Professor Bower in examples supplied by Mr. Druery, of *Athyrium Filix-fœmina clarissima*, and *Polystichum angulare pulcherrimum*. In this departure, the production of spores is suppressed; the Prothalli in the former being modified sporangia, while, in the latter Fern, no trace of the sporangium even can be detected. The sexual reproduction is not affected, and the leafy Ferns are developed from the Prothalli in the usual way.

Though of very great scientific interest, the development of Prothalli, and of the sexual organs on them, is of less practical importance to gardeners in the other groups of Vascular Cryptogams than it is in the true Ferns; but an outline of the chief points of difference in these groups may be given. In the small group *Ophioglosseæ*, represented in the British Flora by the Moonwort and Adder's Tongue Ferns, the Prothallus is formed underground, is destitute of chlorophyll, and is usually formed of a mass of cells. It produces sexual organs, which resemble those of Ferns in the main. The *Equisetineæ*, or Horsetails, resemble Ferns in the Prothalli being green, flattened layers of cells, growing on damp surfaces; but they become branched into long, narrow lobes, and may reach ½in. in length. They are diœcious, *i.e.*, each produces only antheridia or archegonia. The former are produced near the tips of the lobes of the male Prothalli; the latter usually in the clefts between the fleshy lobes of the female Prothalli. The development of the sexual organs, and of the "leafy plant" (if an Equisetum deserves this designation), calls for no special comment here, as it agrees in the main points with that in Ferns.

The Club-mosses fall into two groups, of which one, the *Lycopodieæ*, much require to have their development worked out. So far as is known, their Prothalli are irregularly-lobed masses of cellular tissue, and bear both

Prothallus, or Prothallium—*continued.*

antheridia and archegonia; and the young, leafy plant continues to draw nourishment from it for a time, as in Ferns. There is only one form of spores in this group, and the Prothalli are, therefore, all alike in each species. The second group, *Selaginelleæ*, is largely cultivated in greenhouses, and the cycle of development has been fully studied. In this group, spores of two kinds are produced in sporangia, in the axils of the leaves, near the tips of branches of the leafy plants. The two kinds are the microspores and the macrospores, which produce male and female Prothalli respectively. The microspores (from *mikros*, small, and *spora*, a spore) are much smaller than the macrospores (from *makros*, large, and *spora*). The Prothalli developed from both are very much reduced in size, as compared with the Prothalli already described; indeed, the greater part, or even the whole, of their development, goes on *inside the spores*. The peculiarities of development of these Prothalli have been very carefully investigated, and described in detail, by Millardet, and by Pfeffer. The male Prothallus is developed entirely in the interior of the microspore. In this, a small part (the vegetative cell) is first cut off, and the remaining contents are divided by cell walls into six or eight cells, and these (or only certain of them in some species) divide still further to form the parent cells of the antherozoids. In each of these, a long, slender, spiral antherozoid, with cilia at one end, is produced. The macrospores, while still in the sporangium, in *Selaginella*, show a mass of small-celled tissue, like a cap, at one end, covering a very large cell, which occupies the greater part of the spore. After the spore has been for some time out of the sporangium, this large cell becomes filled with a mass of cells of comparatively large size, individually, which Pfeffer regards as analogous to the endosperm in the seeds of angiosperm flowering plants. The cap above this mass is the Prothallus, and this increases in size, and archegonia form in it, beginning at the apex, and gradually forming at a greater distance from the apex. The coats of the spore burst above the Prothallus, which projects a little. The structure of the archegonium and of the oosphere, and the mode of fertilisation, are similar, in the important points, to those above described as occurring in Ferns; and so, moreover, is the development of the leafy plant. In the nearly allied genus *Isœtes* the development is much like that in *Selaginella*, but no endosperm is formed in the macrospore. The *Rhizocarpeæ* agree, to a considerable extent, with the *Selaginelleæ*.

The great interest of the Prothallus in *Selaginelleæ* and the allied forms rests in the light the study of it throws on the processes of reproduction in Phanerogams (*see* **Ovule** and **Pollen**). The homologous stages, or what are at present regarded as such, may be briefly stated as follows. In Phanerogams, the pollen grains represent the microspores, and the multicellular nature of the pollen corresponds to the multicellular microspore of *Selaginella*, with its rudimentary Prothallus represented by the vegetative cell. The Gymnosperms and the Angiosperms differ as regards the ovule. In Gymnosperms, the temporary endosperm is regarded as representing the Prothallus inclosed in the embryo-sac as its macrospore; the corpuscula represent archegonia, the rosette cells represent the neck of the archegonium, and the central cell of the corpusculum represents the oosphere. As already stated, the large-celled tissue in the macrospore of *Selaginella* is regarded by Pfeffer and Sachs as representing the endosperm that develops in seeds after fertilisation. In Angiosperms, the embryo-sac represents the macrospore, the antipodal cells, perhaps, correspond to the Prothallus, the embryonal vesicle to the oosphere, the helper-cells to the neck of the archegonium, and the endosperm has the significance already stated.

PROTOGYNOUS. - *See* **Proterogynous.**

PROTOPLASM (from *proton*, first, and *plasma*, formed matter). A word frequently used by students of the microscopic structure of plants and of animals. The term was first proposed, in 1846, by the distinguished German botanist, Hugo von Mohl, and is still used in the sense employed by him, to denote the transparent, soft, semi-fluid, jelly-like substance found in young, living cells of all plants. He was the first to appreciate the true importance of this substance. Before his observations were made, it had been very generally believed that the wall which bounds each cell, and remains very evident after the cell contents have been emptied out, was the essential part of the cell; and the name "cell" was given to the space inclosed by the cell wall. It seems to have been first used, in 1665, by the English microscopist, Robert Hooke, who says: "Our microscope informs us that the substance of cork is altogether filled with air, and that that air is perfectly inclosed in little boxes or cells, distinct from one another." Von Mohl recognised that the really essential part of the cell is the Protoplasm; and that by it other cell contents and the cell wall are produced. This view has been fully confirmed by later investigations, and also by the fact that among Ferns, Mosses, and other flowerless plants, the essential reproductive cells, for a time, consist of Protoplasm alone, without a cell wall.

In young, growing tissues, such as the tip of the root of a Bean, or of any other large seedling, the Protoplasm at first frequently fills the space bounded by the cell wall. At one place lies a denser, round or oval mass, also composed of Protoplasm, called the "nucleus," with a clearly-defined edge. As the cell grows larger, the Protoplasm does not increase so much as to fill the space within the cell wall. Cavities appear in it, occupied by fluid or cell sap. These are, at first, separated by plates of Protoplasm; but, with continued increase in size of the cell, the vacuoles unite, and form one large cavity in the centre, occupied by cell sap; and the Protoplasm forms only a layer lining the cell wall.

When a living cell is laid in strong glycerine or in alcohol, the water of the cell sap and of the Protoplasm is drawn out of the cell by these fluids, and the contents shrink away from the cell wall, leaving an empty space between them and the wall all round. The outer surface of the shrunken mass is clearer and less granular than the rest, and looks almost like a distinct coat. It was formerly known as the "primordial utricle," but is now more usually called "ectoplasm" (from *ektos*, outside, and *plasma*). The inner substance, called "endoplasm" (from *endon*, inside, and *plasma*), is more granular, and incloses starch grains and other bodies connected with the nourishment of the tissues of the plants.

Living Protoplasm is constantly undergoing rapid changes of composition, taking into it new food, forming new bodies or products, and getting rid of materials that have done their work, and must be thrown out. All this implies constant changes in the position of the minute particles of which Protoplasm consists, though these movements are too slow, and the particles are usually too small, to permit of their being followed under the microscope. But in many cells (probably in most) the Protoplasm is seen to be moving round and round the cell, if it forms only a layer lining the cell wall; or it may be seen to move along the slender plates between the vacuoles, from the outer layer inwards towards the layer around the nucleus, and again outwards. Often a thin thread or plate shows two streams on its sides moving in reverse directions. Cells that consist of Protoplasm without a cell wall, are usually able to move freely about in water by moving fine threads or cilia, or by pushing out pseudopodia, or outgrowths, from the surface, and flowing towards these, *e.g.*, in some stages of *Myxomycetes*, such as Flowers of Tan, and other Fungi closely related to it.

Protoplasm—*continued.*

The chemical composition of Protoplasm is very complex. It belongs to the group of substances similar in nature to white of egg, or albumen. It is very similar in its properties in plants and in animals, in which latter it has been called "sarcode" (from *sarx*, flesh). When laid in a solution of iodine, it becomes yellowish or pale yellowish-brown. Dyes, such as magenta, eosin, and other aniline colours, carmine, logwood, &c., very generally colour dead Protoplasm readily, especially the nucleus; but the living substance resists their action. A dilute solution of caustic potash dissolves Protoplasm, and is therefore often used, in microscopical work, to clear it out of sections where the chief desire of the operator is to see the arrangement of the cell walls only. Other tests for distinguishing Protoplasm are also occasionally used; but for these, inquirers are referred to such works as Sachs' "Textbook of Botany," Henfrey's "Elementary Course of Botany," Bower and Vine's "Practical Botany," or other works dealing technically with the subject.

PROUSTIA (named after Proust, a Spanish chemist, who died in 1826). ORD. *Compositæ*. A genus consisting of six or seven species of stove or greenhouse, erect or climbing, hoary-tomentose or glabrous, sometimes spiny shrubs, natives of South America and Mexico. Flower-heads small, sessile, homogamous, disposed in much-branched or thyrsoid panicles at the ends or sides of the branches; receptacle naked; corolla bilabiate, with the segments revolute, the outer three- or four-toothed, the inner lip deeply two-parted; achenes turbinate or oblong, five-ribbed, with a pappus of copious setæ. The under-mentioned species—the only one yet in cultivation—is a desirable greenhouse climber. For culture, *see* **Mutisia.**

P. pyrifolia (Pyrus-leaved).* *fl.-heads* white; pappus purple. *l.* petiolate, round-cordate or oval, tomentose beneath; adult ones coriaceous, densely tomentose beneath, entire or irregularly toothed. Chili, 1865. (B. M. 5489.)

PROVENZALIA. A synonym of *Calla*.

PRUINATE, PRUINOSE. Covered with glittering particles, as if frosted over.

PRUMNOPITYS. Included under **Podocarpus** (which *see*).

PRUNELLA (altered from *Brunella*, derived from the German *Die Braüne*, a disorder in the jaws and throat, which the plants were supposed to cure). The correct spelling, according to Bentham and Hooker, is *Brunella*. Self-heal. ORD. *Labiatæ*. A small genus (two or three species) of broadly-dispersed, decumbent or sub-erect, hardy perennial herbs. Flowers purplish, bluish, or white; calyx tubular-campanulate, two-lipped; corolla tube ample, often exserted, the upper lip erect, concave, the lower spreading; whorls six-flowered, in dense, terminal spikes, surrounded by broad, imbricated bracts. Leaves entire, incised-toothed, or pinnatifid. The species are well adapted for ornamenting rockwork, or the front of a flower border. They thrive in any light, rich soil, and may be readily increased by divisions.

P. grandiflora (large-flowered). *fl.*, corolla violet or purple, above 1in. long, more than twice the length of the calyx. August. *l.* petiolate, ovate, often toothed, especially at the base, sometimes sub-hastate, sometimes entire. *h.* 6in. Europe, 1596. This scarcely differs from *P. vulgaris*, of which it is probably a variety. (B. M. 337; F. D. 1933.)

P. hyssopifolia (Hyssop-leaved). *fl.* larger than those of *P. vulgaris*; corolla purplish, rarely white. August. *l.* sessile, oblong-linear or lanceolate, entire, strigose-hispid. Stems ascending, 6in. to nearly 12in. long, ciliate-hispid. Mediterranean region, 1731.

P. vulgaris (common). All-heal. *fl.*, calyx purplish; corolla purple, rarely rosy or white, ½in. to ¾in. long; whorls in cylindric spikes, 1in. to 3in. long. July to September. *l.* 1in. to 2in. long, petiolate, the uppermost ones sessile, ovate-oblong or oblong-lanceolate, entire, toothed, or sub-pinnatifid. Stems 4in. to 12in. long, erect or ascending. Europe (Britain). (Sy. En. B. 1059.) There are several varieties of this species.

PRUNING. Pruning consists in removing any part of a tree, either stem, branches, or roots, with a view to repressing growth in one direction, and directing the course of sap towards other parts of the tree which are better situated and constituted for performing the natural functions. The work is one of the most important in gardening, but, when the several habits and modes of fruit-bearing adopted by cultivated trees are understood, it is by no means difficult. Pruning is essential where trees have to be subjected to artificial treatment in a limited space, as in gardens generally, where, for example, a Plum-tree may be grown against a wall, or as a bush, pyramid, or standard. These shapes are produced by a combined system of Pruning and training to prepare trees for filling the several positions assigned them, and contributing a crop from one and all. There are several objects in Pruning, and the results attained vary exceedingly from the time and manner in which the work has been performed, and from other causes, some of which are beyond control. The thinning and removal of superfluous and useless shoots, with a view to admitting light and air, which are essential for insuring productiveness; the affording of encouragement towards promoting the formation of blossom-buds on branches hitherto barren; the modification of form in trained trees; the enlargement of fruit; the removal of dead, dying, or diseased branches, and many other such operations, may be cited as objects for which Pruning may be performed. One of the immediate effects of Pruning is to divert the course of the sap, which has hitherto been utilised by the branch removed, into others which are left; this causes them to strengthen and enlarge, which is one of the results generally aimed at. In the management of fruit-trees, the art of Pruning has a most important bearing, as, under artificial treatment, these have often to be cultivated in a limited space, and trained to a shape not in accordance with their natural habits. Again, on the system of management, in respect of thinning and removing the useless wood, and exposing that left to become well ripened, depends materially the state of the crops annually secured. The extent to which Pruning may with advantage be practised, depends very much on the subject under treatment, its rate of growth, and many other local circumstances. Some practitioners recommend a free, others a moderate, use of the knife; and others, again, use it as little as possible consistent with keeping their trees within bounds and preserving an evenly-balanced head. On a subject capable of such a wide and varied application, this is scarcely to be wondered at; and as different soils and localities have their own particular influence over the trees grown in them, so does the proper system of treatment vary somewhat in detail. Although hard Pruning is not here recommended, it is considered essential that the system must be moderately practised, and the work conducted with a view to preserving an equality and symmetry amongst the branches, which shall also, at the same time, promote vigour and fertility. Young trees are invariably disposed to produce more branches than space can be provided for. By thinning out those which are weak and misplaced, additional nourishment is supplied to the others, which may be allowed to develop, and remain almost, or quite, their full length. Where the system of training to be adopted cannot be commenced because of the shoots being improperly disposed, Pruning must be resorted to, and the sap thereby caused to flow more freely where it is required. If a young fruit-tree can be grown on without much cutting, until it arrives at a bearing state, it has, usually, much cleaner and healthier branches, which, of course, are more favourable to fruit-production than others developed under a system which involves frequent amputation, however much this may be necessary in training to a desired shape.

Pruning—*continued.*

The seasons when Pruning is most generally practised are summer and winter, summer Pruning being conducted at various times through the summer, and winter Pruning principally in December, January, and February. By adopting a proper system of summer pinching and stopping, much good may result to the branches retained, from their being more exposed to light, and there will be less need of cutting severely in the winter. When branches are allowed to grow at will, particularly towards the centre of a tree, they frequently become too vigorous for fruit-bearing themselves, and, by utilising the sap, render others unproductive. If attention to summer stopping in such cases is neglected, and the strong branches are removed at the next winter Pruning, it invariably happens that a difficulty arises in getting the flow of sap equalised, and the next spring others, even stronger shoots, start from the position where those of the previous year have been taken away. Summer Pruning then, in relation to permanent training, may be commenced so soon as the relative strength and position which the young shoots are likely to take, can be ascertained; it must be continued at intervals according to the subject under treatment and its natural mode of fruit-bearing. Trees that produce fruit on the short side branches, which are usually termed spurs, may be subjected to a course of summer Pruning, with a view to the production of those spurs furnished with blossom-buds. This work must not be performed before the shoots have reached a certain stage, else the buds at the base of the spurs left will develop into growth the same season, instead of remaining dormant, and forming themselves into fruit-buds for the next. July is generally the most suitable month: the wood is by that time partially solidified, and, if the leading branches are left unstopped, and there is a crop of fruit, most of the sap will be utilised. It not unfrequently happens that fruit-trees which bear on spurs become, from constant Pruning, too thickly furnished with them, and some get long and unfruitful. It is then best to cut some hard back at the winter Pruning, only leaving such as are properly situated. In most cases, other shoots will proceed the next year from near the place where the old spurs have been taken away, and these may, in due course, be subjected to similar treatment, and allowed to remain if there is sufficient space. The summer Pruning of fruit-trees which do not bear on spur branches is of an entirely different character. Apples, Apricots, Pears, and Plums—four of our principal fruits—bear more or less on spurs; but two others, also of great importance—Peaches and Nectarines—are usually managed so as to fruit on what is called young wood—that is, wood made during the previous year. Summer Pruning of these trees consists, therefore, in cutting out whatever wood is known to be useless, and in laying-in and encouraging new shoots to take its place. Disbudding may be considered a branch or part of Pruning, inasmuch as the young shoots removed thereby at an early stage have not to be taken out afterwards, and the full exposure to light, which is such an essential condition, is insured to the foliage of those that are allowed to remain.

At the winter Pruning, all trees should be examined, but much less work will be required where proper attention has been bestowed through summer; indeed, the operator will readily see why each of the shoots has been preserved, and will understand which have been left with the intention of being taken out during winter. All weak wood may always be cut away, but attention should be given to leaving eyes, if possible, to furnish wood afterwards where it is required, that, starting afresh, will possibly be of a stronger description the next year. As a rule, fruit-trees are more inclined to become crowded than to be too thin, especially in and about their centres; this must be guarded against, or sunshine and air cannot get the admission and circulation

Pruning—*continued.*

essential for ripening both fruit and wood. All dead wood should be cut out at the winter Pruning, and the leaving of sterile and unripened wood or spurs carefully avoided. In Pruning young trees that are intended for training into any particular shape, their form must always be borne in mind, and the leading branches kept at about regular distances from each other. Trees that are full grown, and have reached their intended limits, are most easily pruned in winter, as they require similar restriction and cutting each year, with a removal of some of the spurs and branches when the latter become too numerous. Occasionally, different varieties of a particular fruit require altogether a different system of Pruning, as, for instance, Cherries. All the sweet varieties of these should be pruned on the spur system, while the Morello bears best on the long, young shoots. At the winter Pruning, therefore, all the latter should be allowed to remain, so far as space can be provided for them. *See* **Cherry.** Notes on Pruning the different fruits named may also be found under **Currant, Fig, Gooseberry, Pear, Plum, Vine,** &c. Peaches are dealt with under **Nectarine.** Apple-trees that have not attained full dimensions should have about 1ft. left on the tops of the leading branches at each winter Pruning, and some side branches should also be left where there is sufficient room for them to develop. Others not required may be cut back to form spurs; these, and clusters of buds, are the methods of fruit-bearing which the Apple adopts. Apricot-trees fruit mostly on strong spurs, which must, therefore, be preserved; all the leading shoots must be trained and nailed in, and the side growths cut back for forming spurs. Unfortunately, the branches of these trees are liable to die away, one after the other, until, sometimes, the whole tree goes. Such branches must be cut away, and new ones encouraged to fill up the space: the old ones are those which die off most frequently. Apricot-trees have invariably to be grown on walls; any spurs which get old, and project a long way out, should be gradually taken away at the winter Pruning.

Root-pruning has a very important bearing in connection with top-growth and fruit-production; the two last named also often very materially depend on the sort of stock used for working upon. Some stocks are more fibrous-rooted than others, and are not so vigorous-growing—as, for instance, the Paradise and Quince stocks for the Apple and Pear respectively, in comparison with the Crab and wildling Pear. What was at one time performed, or attempted, solely by Pruning, is now much more readily attained, in these two important instances, by the use of stocks that favour a dwarf, pendulous habit, and great productiveness, instead of vigorous wood-growth, which seldom accompanies or precedes a fruitful habit. It is not, however, always desirable or practicable to cultivate trees on dwarfing stocks, and it is then that the effect of Root-pruning, when adopted, is most plainly marked. This operation is best performed in autumn, but it may be safely practised, under certain conditions, at almost any season, except during spring, and until the leaves have well expanded. No precise rules can be laid down as to when Root-pruning would be beneficial, but it usually proves so when fruit-trees make an over-luxuriant growth, and bear comparatively few blossom-buds. When practised in autumn, a trench should be dug out at a distance from the tree proportionate to its size; the soil may then be forked from the ball outwards, and the roots examined. If they are found long, and destitute of fibres, cutting off the leaders will induce them to produce small roots; and this will, doubtless, have the desired effect, eventually, of modifying and checking the top-growth in a corresponding manner, and also of increasing fertility. Top-

Pruning—*continued.*

growth is regulated by that beneath ground, and the necessity for Top-pruning is reduced to a minimum when the main leading roots are prevented from taking a wide-spreading or downward course, without being properly furnished with a due proportion of others of a fibry description. The necessity for Root-pruning may therefore be judged from the appearance of a tree above ground; the operation is not, of itself, desirable, but is a valuable means to an end whereby moderate growth and productiveness, more or less permanent, may be insured.

The remarks already made on this subject have reference more especially to the management of fruit-trees; but there are endless other subjects among which Pruning may, with advantage, be enforced. Deciduous and evergreen forest and ornamental trees require frequent attention in order to keep them within proper limits, and induce them, particularly when young, to grow into shapes according to their habit, and the purpose for which they are required. Pyramid trees, for instance, generally need some Pruning to bring them into proper shape; and it is a frequent occurrence to find several leaders growing where there should only be one. Many evergreen shrubs, too, where they have to be kept within limits, need both summer and winter Pruning; otherwise, one would soon overgrow its neighbour, especially where some of a slow-growing and others of a fast-growing, nature are planted near each other. Summer Pruning amongst shrubs supplies almost constant employment, where shrubberies are extensive. When a severe cutting-back becomes requisite, as it sometimes does with Aucubas, Box, Laurel, Yew, &c., it should be attended to about April or May; the shrubs then soon recover. There are

Pruning—*continued.*

numerous subjects amongst indoor plants benefited by judicious Pruning, to which it is unnecessary to refer in detail; indeed, it would be impossible to name them from memory. Some have to be pruned hard back each year, and others only require thinning to admit air and light amongst their leaves, to assist in perfecting the foliage, flowers, or fruits, as the case may be.

PRUNING KNIVES, &c. Of the several instruments in use for Pruning, the Knife is most generally in request, and, as it can be used for various other purposes, few things are more requisite. Pruning Knives are made in various shapes, some being nearly straight in the blade, while others are curved and carried to a point. Proper Pruning Knives are fixed into strong buckhorn handles, and are provided with a sheath to hold them when not in use; but those most extensively used for Pruning are made to shut up in the usual way, which renders them more portable. Buckhorn handles are best, as, having an irregular surface, they afford a grip for the hand. For small shoots, a straight-edged blade is preferred, but with a curved blade the operator has more command over a large branch.

Besides a Knife, most useful instruments are small Pruning Shears, or Sécateurs, and a Pruning Saw. There are various sizes and makes of the first-named in use, according to the size of the branches that are to be cut. Some have a movable centre, which causes them to draw and cut like a knife; others, very strong and well adapted for pruning Gooseberries, Roses, &c., are riveted together, and answer for the purpose most effectually. Pruning Saws are often required for removing branches that are too strong for the Knife or Shears. The blades are narrow, and somewhat like those employed for

FIG. 299. BRANCH OF PRUNUS BIFERUM, showing Fruit not yet arrived at Maturity and Second Crop of Flowers from the Young Wood.

Pruning Knives, &c.—*continued.*

turning, and for cutting circular holes in boards; they are carried very narrow at the point, and may be introduced to cut off one branch without injuring another.

PRUNOPSIS LINDLEYI. A synonym of **Prunus triloba** (which *see*).

PRUNUS (the ancient Latin name of the Plum). Plum. ORD. *Rosaceæ*. This genus, as arranged, by Bentham and Hooker, in the "Genera Plantarum," includes *Amygdalopsis*, *Amygdalus*, *Armeniaca*, *Ceraseidos*, *Cerasus*, *Laurocerasus*, and *Persica* (making a total of about eighty species); but, for horticultural purposes, it is, in most cases, deemed proper to treat these genera separately in this work. The species are evergreen or deciduous, hardy trees or shrubs, mostly natives of the temperate regions of the Northern hemisphere, some being found in tropical America, and rarely in tropical Asia. Flowers white or pink, solitary, corymbosely fasciculate, or disposed in racemes; calyx deciduous; tube obconical, urceolate, or tubulose; limb of five imbricated lobes; petals five, inserted at the mouth of the calyx; stamens fifteen to twenty, inserted with the petals. Fruit a fleshy, often edible drupe, containing a smooth or rugose, indehiscent or two-valved, one-seeded stone. Leaves alternate, simple, frequently serrulated, complicate or convolute in vernation. The species may be propagated by seeds, which should be stratified in autumn, and sown in the following spring. They may also, with the varieties, be readily increased by budding and grafting. *P. cerasifera* is well adapted for planting to form hedges; the use of the Blackthorn or Sloe, *P. spinosa*, is also well known for this purpose. *P. divaricata*, invariably one of the earliest-flowering shrubs or small trees, is exceedingly ornamental, when the flowers escape destruction by spring frosts. *P. Pissardii* has dark foliage, which is effective when associated with light-coloured or yellow-leaved shrubs. The double-flowered form of *P. sinensis* may be grown in pots, and used effectively for greenhouse decoration. It may readily be propagated, in spring, from cuttings of tolerably firm shoots; and when plants are established, and their wood well ripened, they force well. *P. triloba* may also be grown in pots, but the best position for this species is against a wall with a south or west aspect. For culture

FIG. 300. FRUIT AND LEAVES OF PRUNUS CHAPRONII.

Prunus—*continued.*

and varieties of the common Plum, *see* **Plum**, where will be found further information applicable to the propagation and cultivation of other species of *Prunus*. All the species described below are hardy, deciduous trees or shrubs, except where otherwise stated.

FIG. 301. FLOWERING BRANCH OF PRUNUS PENNSYLVANICA.

P. americana (American). American Wild Yellow or Red Plum. *fl.* white; pedicels few or several, in simple, umbel-like clusters. April. *fr.* yellow, orange, or red, ½in. to ¾in., or in cultivated states 1in. or more, in diameter, of a pleasant flavour, but with a tough and acerb skin. *l.* ovate or somewhat obovate, conspicuously pointed, coarsely or doubly serrated, glabrous when mature. *h.* 8ft. to 20ft. North America. SYN. *P. nigra* (B. M. 1117).

P. biferum (twice-bearing). *fl.* large, white, appearing in April on the old wood, in small, umbellate clusters, those appearing later at the ends of young shoots in short racemes. *fr.* stalked, regularly elliptic; skin smooth, glossy, tinted or spotted with violet-rose. *l.* broadly oval, narrowed to both ends. A vigorous-growing tree, of garden origin. For its peculiarity in bearing flowers and fruit at the same time, this curious Plum is worth growing. (R. H. 1875, 415.)

P. cerasifera (Cherry-bearing).* Cherry or Myrobalan Plum. *fl.* white, nearly solitary, or fascicled on short branches, pedunculate; calyx lobes reflexed; petals obovate-oblong or orbicular. April. *fr.* red, globose, with yellow flesh and an ovoid, acute stone. *l.* elliptic-obovate, acute, serrulated, glabrous beneath. Branches unarmed; branchlets highly glabrous. Native country uncertain. (B. M. 5934.)

P. Cerasus Bigarella (Bigarella). A synonym of *Cerasus duracina*.

P. Chapronii (Chapron's). *fr.* shining red, dotted with white, of an agreeable acid flavour, depressed globose, about 1½in. in diameter. *l.* elliptic, acute, serrulate. 1883. A small, bushy tree, of unknown origin. See Fig. 300. (R. H. 1881, 467.)

P. dasycarpa (thick-fruited.) This is the correct name of the plant described in this work as *Armeniaca dasycarpa*.

P. divaricata (spreading).* *fl.* white, ¾in. in diameter, solitary; calyx lobes recurved; petals rounded, concave. April. *fr.* yellow, 1in. long, ellipsoid or globose. *l.* contemporary with the flowers, lanceolate, becoming more ovate and often sub-cordate at base, 2in. long, glabrous beneath; petioles slender. *h.* 10ft. to 12ft. Caucasus, &c., 1822. A small tree, branching at the base. (B. M. 6519.)

Prunus—*continued.*

P. domestica (domestic).* Common Plum. *fl.* white, usually solitary. Spring. *fr.* variable, both in shape and colour. *l.* ovate-lanceolate, convolute. Branches unarmed. *h.* 20ft.

Prunus—*continued.*

P. insititia (grafted). Black Bullace; Bullace Plum. *fl.* white; peduncles twin. Spring. *fr.* globular, black or white. *l.* ovate or ovate-lanceolate, convolute, downy beneath. Branches spiny

FIG. 302. FLOWERING BRANCH OF PRUNUS SINENSIS FLORE-PLENO.

England. There are numerous varieties of this species, including double-flowered and variegated-leaved, many of which are desirable for plantations, hedges, &c. The species and its varieties are deciduous. (Sy. En. B. 410.)

P. ilicifolia (Holly-leaved). A synonym of *Cerasus ilicifolius.*

at the apex. *h.* 10ft. to 15ft. Europe (Britain), Asia. A small, deciduous tree, with spreading, round branches. (Sy. En. B. 409.)

P. lævis (smooth). A synonym of *Persica vulgaris lævis.*

P. Laurocerasus. A synonym of *Cerasus Laurocerasus.*

P. maritima (sea-loving). Beach Plum. *fl.* white, borne on softly

Prunus—*continued.*

pubescent pedicels. April. *fr.* purple or crimson, with a bloom, globular, ½in. to ¾in. in diameter, the stone very turgid. *l.* ovate or oval, finely serrated, softly pubescent beneath. *h.* 2ft. to 3ft. North America, 1800. Plant straggling.

P. Mume (Mume). *fl.* appearing early, usually twin, sub-sessile. *fr.* globose, very slightly velvety; stone oval, convex, foveolate. *l.* rounded at base, obovate or broadly elliptic, long-cuspidate, argutely duplicate-serrated, glabrous or mostly pubescent-scabrous beneath. Japan. (S. Z. F. J. ii.)

P. nigra (black). A synonym of *P. americana.*

P. paniculata (paniculate). A synonym of *Cerasus pseudo-cerasus.*

P. pennsylvanica (Pennsylvanian). American Wild Red Cherry. *fl.* white, many in a cluster, on long pedicels. May. *fr.* light red, globose, very small, with thin and sour flesh; stone globular. *l.* oblong-lanceolate, pointed, finely and sharply serrated, shining, green and smooth on both sides. Bark light reddish-brown. *h.* 20ft. to 30ft. North America, 1773. See Fig. 301.

P. Persica (Persica). A synonym of *Persica vulgaris.*

P. Pissardii (Pissard's).* *fl.* white. March and April. *fr.* small, or hardly medium size, somewhat oval, deep red or purple, even when very young; flesh pulpy, sugary when mature. *l.* glabrous, broadly oval, red-purple. Twigs glossy black. A handsome, ornamental shrub or small tree, introduced to Europe, a few years ago, from Persia. (R. H. 1881, 190.)

P. pumila (dwarf). This is the correct name of the plant described in this work as *Cerasus depressa.*

P. salicifolia (Willow-leaved). *fl.* white, small, growing singly or several together. April. *fr.* about the colour and size of those of *P. cerasifera.* *l.* obovate, acuminate, glossy and rugulose above, quite smooth beneath, finely serrulated, the serratures minutely glandular; petioles short, without glands. China.

P. sinensis (Chinese).* *fl.* white, small, disposed in clusters along the shoots. Spring. *fr.* small, globular, deep red, of peculiar but agreeable flavour. *l.* oblong, acuminated, serrulated. China, 1869. Of this species, there are varieties with rose and double white flowers. See Fig. 302.

P. spinosa (spiny). Blackthorn or Sloe. *fl.* white, rising before or with the leaves, on solitary peduncles. Spring. *fr.* black, roundish, sour or acid. *l.* obovate-elliptic or ovate, smooth except when young, sharply and doubly serrated. *h.* 10ft. to 15ft. Europe (Britain). A well-known, deciduous shrub, with spinose branches. (Sy. En. B. 408.) There are two or three varieties, including double-flowered, variegated-leaved, large-fruited, and egg-shape-fruited, forms.

P. subhirtella (somewhat hairy). *fl.* white, with a red calyx, small, borne three or four together on the short growths. *l.* small, ovate, acuminate. Branches pendent, with slender branchlets. *h.* 10ft. Japan, 1868. An elegant tree. SYN. *Cerasus pendula.*

P. triloba (three-lobed).* *fl.* white or rose, generally double, large. Early spring. *l.* three-lobed, appearing after the flowers. *h.* 6ft. China, 1857. A very handsome, early-flowering shrub. SYNS. *P. virgata* (of gardens), *Amygdalopsis Lindleyi* (F. d. S. xv. 1532; R. G. 1863, 53 and 54), *Prunopsis Lindleyi* (R. H. 1883, 367).

P. virgata (twiggy). A synonym of *P. triloba.*

PRURIENT. Stinging; causing an itching sensation.

PSAMMA (from *psammos*, sand; alluding to the use to which the species are put). Marrem Grass. ORD. *Gramineæ.* A small genus (two species) of hardy grasses, inhabiting the shores of Europe (Britain) and North Africa. Spikelets in a contracted panicle, much laterally compressed, one-fid; empty glumes two, scarcely exceeding the flowering ones, rigid, long, narrow, keeled; flowering glumes rigid, slightly pedicelled, with an oblique callus, and a small pencil of silky hairs at the base. *P. arenaria* is, on some parts of the coast, employed for binding sea sandbanks; it is also used for making mats and thatch. It grows freely in any sandy soil, and may be raised from seeds, but is most readily increased by cutting the long, creeping rhizomes into pieces, and planting them where required.

P. arenaria (sand-loving). *fl.*, spikelets erect; pedicels scabrid; panicle white, sub-cylindric, 3in. to 6in. long, straight, broadest and sometimes lobed at base, the branches short. July. *l.* long, rigid, convolute, polished without, scabrous and glaucous within; sheaths long; ligule very long, bifid. Stems 2ft. to 4ft. high. Rootstock widely creeping. (Sy. En. B. 1722.)

P. baltica (Baltic). This is very similar to *P. arenaria*; it chiefly differs in its looser, less cylindric panicles. (J. B., 1872, 127.)

PSAMMISIA (named after Psammis, or Psammites, a King of Egypt, B.C. 376). ORD. *Vacciniaceæ.* A genus comprising nearly thirty species of stove or warm greenhouse, branched, sometimes epiphytal shrubs, natives

Psammisia—*continued.*

of the Andes and the mountains of Venezuela and Guiana. Flowers frequently scarlet, rather large, disposed in axillary racemes or corymbs, rarely solitary or fascicled; calyx urceolate-campanulate, with a five-lobed or toothed limb; corolla tubular, ventricose or rarely conico-globose at base, with a five-lobed, erecto-patent limb; bracts sometimes pink. Leaves alternate, persistent, coriaceous, sessile or petiolate, entire or subserrate. The species best known in gardens are here described. For culture, *see* **Thibaudia.**

P. Hookeriana (Hooker's).* *fl.* (including the calyx) deep rose-red, paler at the mouth, nearly 1in. long, disposed in axillary and sub-terminal, four to six-flowered racemes. September. *l.* alternate, on short petioles, oblong-obovate, acuminate, but usually rather obtuse. *h.* 1½ft. to 2ft. (in its native place 6ft. to 12ft.). Columbia. (B. M. 4344, under name of *Thibaudia pichinchensis glabra.*) SYN. *P. pichinchensis glabra.*

P. Jessicæ (Mrs. John Bateman's).* *fl.* pale red, ¾in. long, between oblong and cylindric, fleshy; racemes short, solitary, from ten to twelve-flowered. September. *l.* ovate or ovate-lanceolate, 6in. to 10in. long, shortly petioled, rounded at the base, narrowed into a long, acuminate apex, quite entire. Branches pendulous. Caraccas, 1865. (B. M. 5547, under name of *Thibaudia Jessicæ.*)

P. longicolla (long-necked). *fl.*, corolla bottle-shaped, the widest and longest portion of the tube scarlet, the column or neck much contracted, and green, as are the five sub-triangular and somewhat spreading lobes of the limb; racemes short, axillary, glomerate, drooping, partially bracteolate; pedicels fleshy. Autumn. *l.* glossy, coriaceous, 3in. to 4in. long, shortly petioled, much acuminated, entire. *h.* 3ft. to 4ft. South America, 1865. (B. M. 5526.)

P. penduliflora (pendulous-flowered). *fl.* rich scarlet; corolla large, pitcher-shaped, suddenly contracted into a greenish, five-lobed apex; racemes solitary, axillary, many-flowered, secund, and drooping. *l.* about 4in. long, glossy-green, shortly petioled, elliptical, very entire, much and rather finely acuminated, sub-distichous, the base obtuse. Branches terete, green, tinged with red. Caraccas, 1860. (B. M. 5204.)

P. pichinchensis glabra (Pichincha, smooth). A synonym of *P. Hookeriana.*

P. sarcantha (fleshy-flowered). *fl.* red, tipped with green; corolla tubular-urceolate, fleshy, disposed in racemes or sub-umbellate; pedicels one-flowered. Spring. *l.* alternate, coriaceous, on short petioles. Stem erect, branched. New Grenada, 1864. (B. M. 5450, under name of *Thibaudia sarcantha.*) SYN. *P. sclerophylla.*

P. sclerophylla (hard-leaved). A synonym of *P. sarcantha.*

PSEUDÆGLE SEPIARIA. A synonym of **Citrus trifoliata** (which *see*).

PSEUDALANGIUM. A synonym of **Marlea** (which *see*).

PSEUDATHYRIUM. Included under **Polypodium** (which *see*).

PSEUDOBARLERIA (of Anderson). A synonym of **Petalidium** (which *see*).

PSEUDO-BULB. A bulb in appearance, but not in structure; a corm; the thickened internode in epiphytal Orchids.

PSEUDODRACONTIUM (from *pseudo*, false, and *Dracontium*; in allusion to its resemblance to that plant). ORD. *Aroideæ* (*Araceæ*). A genus comprising only a couple of species of stove, tuberous herbs, natives of Cochin China. Male flowers scattered; females densely crowded; spathe erect, boat-shaped, acute, shortly convolute at base, opening above; spadix shorter than the spathe, thick, sessile; peduncle much shorter than the petiole. Leaves trisected, the segments cut or pinnate; pinnæ lanceolate, acuminate, the upper ones confluent and decurrent, the lower ones remote and sessile; petioles elongated, thick, sheathing at base. One species has been introduced; it requires culture similar to **Caladium** (which *see*).

P. Lacourii (Lacour's). This is the correct name of the plant described in this work as *Amorphophallus Lacouri.*

PSEUDOLARIX (from *pseudo*, false, and *Larix*, the Larch, which it resembles). False or Chinese Larch: Golden Larch. ORD. *Coniferæ.* A monotypic genus, the species being a noble, hardy tree. It is distinguishable

Pseudolarix—*continued.*

from the European Larches by the cones having deciduous scales, with divergent points. For culture, *see* **Pinus.**

P. Kæmpferi (Kæmpfer's).* *l.* in bundles on the adult branches, singly on the leading shoots and young plants, slim, linear-lanceolate, tapering to the point, 1½in. to 2½in. long, one line broad, beautiful bright green when young, but becoming golden-yellow in autumn. *cones* pendulous, 3in. long, 2½in. wide near the base, conical, with deciduous scales. Branches similar to those of *Larix europæa*. *h.* 120ft. to 130ft. China. See Fig. 303. (F. d. S. 1777.) SYN. *Larix Kæmpferi.*

FIG. 303. BRANCH OF PSEUDOLARIX KÆMPFERI, WITH MALE CATKINS.

PSEUDOPANAX (from *pseudos*, false, and *Panax*). ORD. *Araliaceæ*. A genus comprising four species of greenhouse, evergreen, glabrous shrubs or small trees, two of which are from New Zealand, and the others natives of Chili. Flowers in small, racemose or paniculate umbels; petals and stamens five, the former valvate; pedicels articulated below the flowers. Fruit sub-globose. Leaves digitate or simple; leaflets coriaceous, often slightly toothed. The two species here described are those introduced to cultivation. For culture, *see* **Aralia.**

P. crassifolium (thick-leaved). *l.* alternate, 2ft. long, and about 1in. broad, thick and fleshy, having a few obtuse, distant lobes along the edges, which end in a short spine; upper surface dark olive-green; midrib prominent, deep orange. *h.* 10ft. New Zealand, 1846. SYNS. *Aralia crassifolia*, *Panax crassifolium*, *P. longissimum*. A garden variety, known as *punctata*, is in cultivation; the leaves are not so thick as those of the type, the marginal lobes are not so blunt, and the colour is dark olive-green, with a continuous line of emerald-green blotches all along, on either side of the midrib.

P. Lessonii (Lesson's). *fl.* rather large; umbels branched, on stout peduncles; pedicels racemose. *fr.* ovoid, ½in. long. *l.*, on old plants, three to five-foliolate; leaflets 1in. to 4in. long, sessile, oblong- or obovate-lanceolate, slightly acute, sinuate-serrate or quite entire, very thick and coriaceous; petioles 4in. to 8in. long. New Zealand. A small, glabrous tree, with very stout branches. SYN. *Aralia trifolia.*

PSEUDOS. A prefix, in Greek composition, signifying false; *e.g.*, Pseudo-costate, false-ribbed.

PSEUDOSCORDUM. A synonym of **Nothoscordum** (which *see*).

PSEUDOTSUGA (from *pseudos*, false, and *Tsuga*). ORD. *Coniferæ*. A monotypic genus, the species being a tall, hardy, evergreen tree. For culture, &c., *see* **Pinus.** A large number of forms, sports, or seedling variations, are grown in some nurseries, under distinctive names.

P. Douglasii (Douglas').* *l.* flat, blunt, entire, pectinate, silvery beneath, 1in. to 1¼in. long, two-rowed. *cones* ovate-oblong, about 4in. long, 1½in. to 1¾in. broad; scales broad, rounded, with conspicuous, projecting, deeply-toothed bracts. *h.* 100ft. to 180ft. North America, 1826. A splendid tree, requiring a somewhat sheltered position, not near the sea-coast. (R. H. 1868, p. 152, under name of *P. Lindleyana.*) SYN. *Abies Douglasii.* There are several varieties, the best of which are:

Pseudotsuga—*continued.*

P. D. pendula (drooping). A variety with elegant, drooping branches. *h.* 50ft.

P. D. Standishii (Standish's). A seedling, with larger leaves than the type, with a deeper green tint above, and quite silvery beneath.

P. D. taxifolia (Yew-leaved). A form with longer leaves and stouter branches, of much dwarfer habit, and more massive, than the normal species.

PSIDIUM (from *Psidion*, the Greek name of the Pomegranate). Guava. ORD. *Myrtaceæ*. A genus of stove trees, shrubs, or rarely sub-shrubs, often villous or tomentose, all (perhaps with the exception of one inhabiting tropical Eastern Asia) natives of tropical and sub-tropical America, one being broadly cultivated over the tropical regions of the globe. Upwards of 100 species have been enumerated, but, according to the authors of the "Genera Plantarum," this number may be considerably reduced. Flowers rather large or rarely small, on axillary or lateral, one to three (rarely many) flowered peduncles, cymose; calyx tube campanulate, urceolate, or pear-shaped, scarcely exceeding the ovary, or more or less produced; lobes of limb four or five; petals four or five, spreading. Berries globose, ovoid, or pyriform, crowned with the calyx limb, or naked; seeds few or many, sub-reniform, hard. Leaves opposite, penniveined. The species thrive best in a compost of sandy, fibry loam,

FIG. 304. FRUITING BRANCH OF PSIDIUM CATTLEYANUM (much reduced).

Psidium—*continued.*

to which a small quantity of leaf mould and dried cow-dung should be added; the drainage must be perfect. Propagated by cuttings of the young shoots, getting a little firm at their base, inserted in sand, under a bell glass, in bottom heat. The following species are occasionally seen in cultivation:

P. aromaticum (aromatic). *fl.* white, solitary. July. *fr.* yellow, globose, four-celled, hardly the size of a cherry. *l.* oblong, acuminated, glabrous. Branchlets tetragonal. *h.* 5ft. to 8ft. Guiana and Cayenne, 1779. Shrub.

P. Cattleyanum (Cattley's).* *fl.* white; pedicels opposite, one-flowered, hardly equal in length to the petioles. May. *fr.* of a fine deep claret-colour, rather large, nearly spherical, growing in the axils of the leaves; the skin has much the consistence of that of a fig, but is thinner; the interior is a soft, fleshy pulp, purplish-red next the skin, but becoming paler towards the middle, and at the centre is quite white; it is juicy, and in consistence is much like a strawberry, to which it bears some resemblance in flavour. *l.* obovate, coriaceous, quite glabrous. Branchlets terete, glabrous. *h.* 10ft. to 20ft. Brazil, 1818. Shrub. See Fig. 304. (B. M. 2501; B. R. 622.)

P. cordatum (heart-shaped). *fl.* white; peduncles one or few-flowered; anthers roundish. May to July. *l.* ovate or oval, rounded at both ends or cordate at base, sessile or shortly petioled, the veins obsolete or inconspicuous. Branches compressed-cylindrical. *h.* 5ft. West Indies, 1811. Shrub. (B. M. 1779.)

P. Guava (Guava). *fl.* white; peduncles three to eight, or many-flowered, downy. June. *fr.* yellow, globose, somewhat astringent, with an agreeable odour. *l.* oval or oblong, elliptic, puberulous beneath. Branches tetragonal. *h.* 6ft. to 15ft. West Indies, &c., 1692. A low tree. SYN. *P. pomiferum.*

P. polycarpum (many-fruited). *fl.* white; calyx closed in the bud; anthers oblong; peduncles usually three-flowered. May. *l.* chartaceous, elliptical or oval-oblong, puberulous beneath; primary veins costate, prominent beneath; secondary ones reticulated and transverse. Branchlets compressed-cylindrical, pubescent. *h.* 3ft. Trinidad, 1810. Shrub. (B. R. 653.)

P. pomiferum (Apple-bearing). A synonym of *P. Guava.*

P. pyriferum (Pear-bearing). Common Guava. *fl.* white, solitary. June. *fr.* yellowish when ripe, pear-shaped; pulp sweet, aromatic, and pleasant. This low tree is simply a form of *P. Guava.* (B. R. 1079.)

PSILA ROSÆ. *See* **Carrot Grubs.**

PSILODOCHEA. Included under *Angiopteris.*

PSILOGYNE. A synonym of **Vitex** (which *see*).

PSILONEMA. Included under *Alyssum.*

PSILOS. Used in Greek compounds, this term signifies thin (Lindley), also naked or bare (Asa Gray).

PSILOSANTHUS. A synonym of *Liatris.*

PSILOSTEMON. A synonym of **Trachystemon** (which *see*).

PSILOSTOMA. A synonym of **Plectronia** (which *see*).

PSILOTUM (from *psilos*, naked; the plants are almost destitute of leaves). ORD. *Lycopodiaceæ.* A genus containing very numerous forms, which are, however, according to Mr. Baker's unpublished Synopsis of the *Lycopodiaceæ*, reducible to two species. The one here described is a curious club-moss, inhabiting the tropical and sub-tropical regions of both hemispheres. It is of little horticultural value. It thrives in well-drained pots of fibrous peat, or may be grown on pieces of such tree ferns as *Dicksonia antarctica.*

P. triquetrum (three-sided). Stems dichotomously forked, compressed or angular, rigid, erect or slender, pendulous; branches numerous, triquetrous. *l.* obsolete or small, bract-like, shortly linear. Sporangia sub-globose, vertically trivalved, solitary in the axils of the leaves. *h.* 9in. 1793. (L. B. C. 1916.)

PSITHYRISMA. A synonym of **Symphyostemon** (which *see*).

PSORALEA (from *psoraleos*, warted or scurfy; in reference to the plants being, for the most part, sprinkled all over or roughened with glandular dots or wart-like points). Scurfy Pea. ORD. *Leguminosæ.* A large genus (about 100 species have been described) of greenhouse or hardy, annual, biennial, or perennial herbs, shrubs, or sub-shrubs, inhabiting South Africa, North and South America, Australia, and the tropical and temperate regions of Asia, Europe, and North Africa. Flowers

Psoralea—*continued.*

purple, blue, pink, or white, capitate, spicate, sub-racemose, or fasciculate, rarely solitary; calyx lobes sub-equal or at length larger, the two upper ones often connate; petals nearly as long, or shorter than the keel; standard ovate or orbiculate. Leaves usually compound, consisting of three to five leaflets, though occasionally the leaves are simple; stipules adhering to the stalk. The Cape species thrive in well-drained, sandy peat, and the others in ordinary garden soil. The shrubby kinds are increased, in April or May, by cuttings of the half-ripened shoots, inserted in sand, under a glass. The herbaceous species are propagated by divisions when the new growth commences. The following is a selection of the best kinds introduced. Except where otherwise stated, they are greenhouse, Cape shrubs.

P. aculeata (prickly).* *fl.* blue and white mixed, axillary, solitary, sessile, approximate. June and July. *l.* trifoliolate; leaflets cuneiform, ending in a recurved mucrone, glabrous; stipules prickle-formed. *h.* 2ft. to 3ft. 1774. (B. M. 2158.)

P. aphylla (leafless). *fl.* blue; keel and wings white; pedicels axillary, short, solitary, one-flowered. May to August. *l.*, lower ones simple or trifoliolate; leaflets linear-lanceolate, upper ones abortive, scale-formed. *h.* 4ft. to 7ft. 1790. (B. M. 1727.)

P. arborea (tree-like). *fl.* bluish; pedicels axillary, one-flowered, longer than the leaves. May. *l.* impari-pinnate; leaflets linear-lanceolate; stipules recurved. *h.* 6ft. to 8ft. 1814. (B. M. 2090.)

P. glandulosa (glandular). *fl.* white, marked with blue, disposed in axillary, spicate racemes; bracts very small, ciliated. May to September. *l.* ternate; leaflets ovate-lanceolate, acuminate; petioles scabrous. Stem erect. *h.* 4ft. Chili, &c., 1770. Half-hardy shrub. (B. M. 990.)

P. melilotoides (Melilot-like). *fl.* pale purple; peduncles racemose; racemes or spikes linear. August. *l.* pinnately trifoliolate; leaflets lanceolate, glandular beneath. *h.* 1ft. to 2ft. North America, 1814. Hardy perennial herb. (B. M. 2063; B. R. 454.)

P. Mutisii (Mutis'). A synonym of *Dalea Mutisii.*

P. pinnata (pinnate-leaved).* *fl.* blue, striped; pedicels axillary, one-flowered, much shorter than the leaves. May to July. *l.* impari-pinnate; leaflets two or three pairs, linear, and, as well as the branchlets, slightly puberulous. *h.* 3ft. to 6ft. 1690. (A. B. R. 474.)

PSYCHOTRIA (from *psyche*, life; referring to the powerful medicinal qualities possessed by several of the species). SYNS. *Myrstiphyllum, Psychotrophum.* Including *Gloneria.* ORD. *Rubiaceæ.* A genus comprising about 500 species of stove shrubs or small trees, rarely perennial herbs, erect, climbing, or twining, all inhabiting tropical regions. Flowers white, green, pink, or yellow, variously disposed; calyx tube short, limb rarely persistent; corolla funnel-shaped, tubular, or sub-campanulate, with a limb of five, rarely four or six, valvate lobes. Leaves opposite, very rarely ternately or quaternately whorled. The species are mostly unattractive, those described below being all that call for mention here. For culture, *see* **Ixora.**

P. chontalensis (Chontales). *fl.* white, in axillary panicles. *fr.* deep blue, usually from forty to sixty on a bunch, presenting a very handsome appearance. Nicaragua, 1870. A very ornamental herb, allied to *P. cyanococca*, but altogether more robust and hairy.

P. cyanococca (blue-fruited).* *fl.* white. *fr.* bright blue, ripening in winter, and disposed in dense clusters of from thirty to forty berries. *l.* elliptic, slightly undulated at the margin. Nicaragua, 1870. A dwarf herb useful as a decorative plant in winter. (F. d. S. 1938; F. M. 479.)

P. jasminiflora (Jasmine-flowered).* *fl.* snowy-white, sub-sessile, in terminal, corymbose panicles; corolla funnel-shaped; tube terete, long, graceful; throat dilated; limb four-parted, spreading. *l.* shortly petiolate, coriaceous, ovate-oblong, shortly acuminate, entire, glabrous above, clothed with white tomentum beneath; margins sub-revolute. A beautiful shrub. (B. M. 6454; G. C. n. s., xii. 200; I. H. xviii. 60, under name of *Gloneria jasminiflora.*)

PSYCHOTROPHUM. A synonym of **Psychotria** (which *see*).

PSYDRAX. A synonym of **Plectronia** (which *see*).

PSYLLA. A large genus of small insects, nearly related to Aphides, which they resemble in their general appearance They feed on the leaves and young branches

Psylla—*continued.*

of plants, sucking the sap through their long beaks. They frequently live in company, and are often more or less covered with a cottony secretion. Some species give rise to distortions of such a kind as to cause them to be reckoned among gall-makers. In repose, the wings are sloped over the back like a penthouse, and the front pair are rounded at the tip. These insects may be known from Aphides by their rather larger size, rounded wings, and harder bodies, and, above all, by their power of leaping, which is given by the strong, thick thighs. They do not show the rapid vegetative reproduction or budding so general among Aphides. The species are found on many different woody plants, and all have very similar habits. Several occur on the Pear-tree (*see* remarks on INSECTS under **Pear**), of which *P. pyrisuga*

FIG. 305. PSYLLA PYRISUGA (the Line below the Insect shows the natural length).

(see Fig. 305) is probably most hurtful; and *P. Mali*, at times, does much harm to Apples. They secrete from their bodies a sweet, clammy substance, which is produced at the expense of the fluids of the plants, and falls on and clogs the surfaces of the leaves. This weakens the food-plants considerably. During winter, many of these insects are hidden in the crevices of the bark, or in similar shelters; hence, no such retreat should be permitted to exist in the neighbourhood of valuable trees that suffer from their attacks.

Remedies. Remove all facilities for concealment from the trees and shrubs. It has been recommended to wash the branches and leaves first with a solution of 2oz. soft soap to a gallon of water, and to follow this up with tobacco-water, Gishurst's Compound, or other insecticides, as recommended under **Aphides** (which *see*). These may be pumped on to the trees from a garden engine.

PTARMICA. Included under *Achillea*.

PTELEA (the ancient Greek name of the Elm, used from the time of Homer, here applied to a genus with similar fruit). ORD. *Rutaceæ*. A genus consisting of six species of hardy, unarmed shrubs or small trees, natives of temperate North America. Flowers greenish-yellow, cymose or corymbose, polygamous; calyx short, four or five-parted, imbricated; petals four or five, much longer than the calyx, imbricated. Leaves alternate, rarely opposite, trifoliolate or pinnately five-foliolate; leaflets ovate or oblong, pellucid-dotted, entire or serrulate. The under-mentioned species—probably the only one in cultivation—thrives in any common garden soil, and is readily increased by layers.

P. trifoliata (three-leaved). Hop-tree; Swamp Dogwood, &c. *fl.*, filaments four or five, densely villous below the middle, longer than the style in the sterile flowers, shorter in the fertile ones. May and June. *l.* long-stalked; leaflets oval or oblong, mostly acute, obscurely crenulated, paler beneath, the lateral ones unequal-sided. *h.* 4ft. to 8ft. 1704. (G. C. n. s., xiii. 369.)

P. t. aurea (golden). This only differs from the type in the golden-yellow colour of the young foliage.

PTELIDIUM (so named from its similarity to *Ptelea*). SYN. *Seringia*. ORD. *Celastrineæ*. A monotypic genus, the species being an ornamental, stove shrub. It thrives best in a compost of loam, peat, and sand. Cuttings of the ripened wood will root readily, if inserted in sand, under a glass, in heat.

P. ovatum (ovate-leaved). *fl.* green, minute, in axillary and terminal cymes, which are shorter than the leaves; calyx segments and petals four. June. *l.* opposite, coriaceous, petiolate, ovate, entire. *h.* 3ft. Madagascar, 1818.

PTERIS. A Fern; the term is also used in Greek compounds to signify a wing, *e.g.*, Pterocarpous, wing-fruited.

PTERIS (the old Greek name for a fern, used by Dioscorides, so called from *pteron*, a feather; in allusion to the shape of the fronds). Brake or Bracken. Including *Amphiblestra*, *Campteria*, *Doryopteris*, *Heterophlebium*, *Litobrochia*, *Ornithopteris*, *Pæsia*, *Pycnodoria*, &c. ORD. *Filices*. A rather large, cosmopolitan genus (upwards of seventy species) of stove, greenhouse, or hardy ferns, including plants of almost every kind of venation and division. Sori marginal, linear, continuous, occupying a slender, filiform receptacle in the axis of the involucre; involucre the same shape as the sorus, usually membranous, at first quite covering it, at length more or less spreading. Except where otherwise indicated, the undermentioned species require stove treatment. For culture, &c., *see* **Ferns.**

P. albo-lineata (white-lined). A form of *P. cretica*.

P. aquilina (eagle-like). Adder-spit; Common Bracken or Brake Fern; Eagle Fern. *rhiz.* wide-creeping, stout, subterraneous. *sti.* 1ft. or more long, strong, erect, straw or pale chestnut-coloured. *fronds* 2ft. to 4ft. or more long, 1ft. to 2ft. broad, subdeltoid; uppermost pinnæ simple; those next in order lanceolate, cut nearly or quite to the rachis into triangular or linear pinnules; the lowest pinnæ long-stalked, 1ft. or more long, with ample, lanceolate pinnules, the latter cut down to the rachis into numerous lanceolate segments, which are again fully pinnate; largest entire ultimate divisions 1in. long, ¼in. broad; rachis and both surfaces sometimes pubescent. Involucre double, or the

FIG. 306. PTERIS ASPERICAULIS TRICOLOR.

PRIMULA ROSEA-PRIMULA PUBESCENS ALBA.

Pteris—*continued.*

inner one obsolete. Ubiquitous (Britain). Many varieties of this species have been found, but they are not constant in cultivation.

P. a. esculenta (edible). Edible Fern of Tasmania. In this variety, the ultimate divisions are narrower than in the type, and not contiguous, and are suddenly decurrent at the base, so that the bases are connected by a narrow lobe. Southern hemisphere, 1850. Greenhouse. The glutinous, underground rhizome of this variety is eaten by the aborigines. SYN. *P. esculenta.*

Other varieties calling for mention are: *glabra*, a smooth, and *lanuginosa*, a woolly, form.

P. arguta (sharply-notched).* *sti.* 1ft. or more long, strong, erect, bright straw-coloured or reddish-brown. *fronds* 1ft. to 3ft. long, 1ft. or more broad; terminal pinna 6in. to 9in. long, 1½in. to 2in. broad, lobed nearly to the rachis, the lobes slightly toothed when barren; pinnæ several on each side, similar to the terminal one, the lowest forked, or with one or two similar smaller pinnules from the base on the lower side. *sori* not usually extending beyond the lower half of the lobes. Madeira, &c., 1778. Greenhouse.

P. argyræa (silvery). A variety of *P. quadriaurita.*

P. aspericaulis (rough-stalked).* *rhiz.* erect. *sti.* rough, purplish when young. *fronds* 1½ft. long, glabrous, pinnate; lowermost pinnæ bipartite, nearly sessile, and opposite; pinnæ deeply pinnatifid or pinnate, attenuated, adnate towards the apex; segments linear falcate, decurrent at base, rather obtuse, slightly crenulate, minutely white-dotted beneath. *sori* chiefly on the middle parts of the segments. India. The variety *rubro-nervia* has a deep purplish-red rachis and midrib.

P. a. tricolor (three-coloured). *fronds*, when young, a beautiful red; when fully developed, a rich, deep green, with attractive silvery markings along the sides of the midribs, which are red. See Fig. 306. SYNS. *P. quadriaurita tricolor* (B. M. 5183), *P. tricolor.*

P. atrovirens (dark green). *sti.* 1ft. long, prickly. *fronds* 1ft. to 2ft. long; terminal pinna 6in. to 9in. long, 2in. to 3in. broad, cut nearly to the rachis into numerous linear lobes, which are slightly toothed when barren; lateral pinnæ in numerous opposite pairs, the lowest sometimes 1ft. long, the lobes similar to those of the terminal one; the lowest pair forked, with a similar, smaller pinnule on the under side; rachis of the pinnules occasionally prickly beneath. *sori* not reaching to the points of the segments. Guinea Coast and Angola. SYN. *P. spinulifera.*

P. aurita (eared). A form of *P. incisa.*

P. biaurita (two-eared). *sti.* 1ft. to 2ft. long, strong, erect, straw-coloured. *fronds* with a terminal pinna, 6in. to 12in. long, 1½in. to 2in. broad, cut nearly to the rachis into numerous spreading, linear-oblong lobes, 1in. or more long; lateral pinnæ similar to the terminal one, the lower ones 2in. apart, and usually once-forked. *sori* continued to the apex. Tropics, &c., 1824. SYN. *Campteria biaurita. P. nemoralis* is, according to Mr. Baker, not distinct from this species.

P. brasiliensis (Brazilian). A form of *P. denticulata.*

P. collina (hill-loving). A synonym of *P. palmata.*

P. comans (hairy). *sti.* 1ft. or more long, erect. *fronds* bipinnate; terminal pinna 1ft. or more long, cut nearly to the rachis into long-linear lobes, which are sometimes 4in. long, ½in. broad, suddenly decurrent at base, bluntly toothed when

FIG. 307. PTERIS CRETICA ALBO-LINEATA.

P. —*continued.*

barren; lateral pinnæ in a few opposite pairs, sometimes 1½ft. long, 6in. broad, the lowest sometimes slightly compound at the base. *sori* falling short of the apex of the segments. East Indies, 1860. SYN. *Litobrochia comans.* The variety *undulata* differs from the type in having blunter ultimate segments, with an undulated edge.

P. concinna (neat). A form of *P. mutilata.*

P. crenata (scolloped). A synonym of *P. ensiformis.*

P. cretica (Cretan).* *sti.* 6in. to 12in. long, erect, wiry, straw-coloured or pale brown. *fronds* 6in. to 12in. long, 4in. to 8in. broad; lateral pinnæ usually in two to six opposite, sessile pairs, the upper one sometimes a little decurrent, 3in. to 6in. long, ⅛in. to ¾in. broad, the sterile ones much the broadest and spiny-toothed, the lower pairs often cleft down nearly to the base into two or three linear pinnules. Involucres pale, membranous. Temperate and tropical regions, &c., 1820. Greenhouse. There is a variegated form of this species, *albo-lineata.* See Fig. 307. (B. M. 5194.)

P. crispa (curled). A garden synonym of *P. straminea.*

P. Currori (Curror's). *sti.* stout, erect, straw-coloured. *fronds* ample, several feet long, 2ft. or more broad; terminal pinna subhastate, deeply lobed; lateral pinnæ numerous, the upper ones 4in. to 6in. long, 1in. broad, with deeply and broadly sinuated margins, the lowest in opposite, sessile pairs, 2in. to 3in. distant from the next pair, 16in. long, 5in. broad, cut nearly to the rachis in the lower part into lanceolate, sinuated lobes, 3in. deep; rachis and both surfaces slightly hairy. *sori* in numerous patches, which are sometimes interrupted and very short. Western tropical Africa. (H. S. F. 140.) SYN. *Litobrochia Currori.*

P. decussata (decussate). A synonym of *P. patens.*

P. deflexa (deflexed). *sti.* 2ft. or more long, strong, erect, straw-coloured or reddish-brown. *fronds* 2ft. to 4ft. long; terminal pinna 6in. to 9in. long, about 1in. broad, long-pointed, and with numerous oblong-linear lobes on each side, which are nearly cut down to the rachis, about ¼in. long, ⅛in. broad, the barren ones sharply spinulose-serrated; lateral pinnæ numerous, similar, the lower ones stalked; lowest pair much larger than the others, often more than 1ft. long, 6in. to 9in. broad, with numerous pinnate pinnules on each side. *sori* reaching nearly to the apex of the segments. Brazil, 1844.

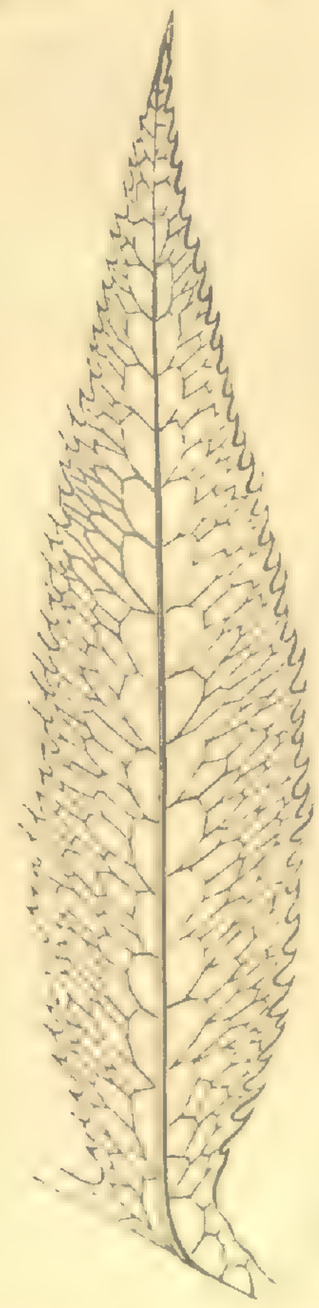

FIG. 308. UPPER PINNA OF PTERIS DENTICULATA.

P. denticulata (slightly-toothed). *sti.* about 1ft. long, slender, wiry. *fronds* 1ft. to 2ft. long, 8in. to 12in. broad; upper pinnæ simple, linear, 4in. to 6in. long, united at base, finely spinulose-serrate when barren; those next in order cut to the rachis and forked; lower ones often pinnatifid, with several linear pinnules, especially on the lower side. *sori* not quite reaching the points of the pinnules. Tropical America, 1824 SYN. *Litobrochia denticu-*

Pteris—*continued.*

lata. See Fig. 308. *P. brasiliensis* is a form with broader, more compound pinnæ.

P. elata (tall). *sti.* 2ft. to 3ft. long, erect, naked, straw-coloured. *fronds* ample, tripartite; terminal pinna 1ft. to 1½ft. long, cut nearly or quite to the rachis into numerous linear lobes on both sides, which are 3in. to 5in. long, the barren ones spinulose-serrate; upper lateral pinnæ 6in. long, not cut to the rachis; lower ones equalling the terminal one; lateral divisions of the frond deltoid. *sori* falling short of the points of the segments. Tropical America. SYN. *Litobrochia elata.*

P. elegans (elegant).* *sti.* 1ft. or more long. *fronds* 6in. to 12in. long, deltoid-cordate, pedate-bipinnatifid; divisions close, reaching nearly to the midrib; terminal and upper lateral ones lanceolate, entire, 1in. to 1½in. broad; lower ones with one to four lanceolate pinnules on the lower side, usually none from the upper. *sori* continuous from base to tip of the divisions. South Brazil. A common species in cultivation. SYN. *Doryopteris nobilis.*

P. ensiformis (sword-shaped). *sti.* 3in. to 6in. long, slender, erect, straw-coloured. *fronds* 6in. to 12in. long, half as broad, with a long terminal pinna and two to four pairs of lateral ones; those of the fertile frond slightly compound, the central portion 2in. to 4in. long, ¼in. or less broad, entire; upper pinnæ of the barren frond decurrent, the lower ones sub-deltoid, cut down to the rachis below into two to six obovate-oblong, sharply-toothed pinnules, which are often nearly ½in. broad. India, &c. SYN. *P. crenata* (H. S. F. 127A).

P. esculenta (edible). A synonym of *P. aquilina esculenta.*

P. fallax (deceptive). A synonym of *Pellæa intramarginalis serratifolia.*

P. felosma (heavy-smelling). A form of *P. quadriaurita.*

P. flabellata (fan-shaped).* *sti.* 1ft. or more long, strong, erect, straw-coloured. *fronds* 1ft. to 3ft. long, 1ft. or more broad; terminal pinna 6in. to 12in. long, 2in. to 3in. broad, numerously lobed nearly to the rachis, the lobes linear, 1in. to 2in. long, barren ones finely serrated: lateral pinnæ similar to the terminal one, the lowest with one to three similar, smaller pinnules from the base on the lower side. *sori* narrow, continuing along nearly the whole length of the segments. South Africa. This species is closely allied to *P. arguta.*

P. Gheisbreghtii (Gheisbreght's). A variety of *P. laciniata.*

P. glauca (glaucous). A synonym of *Pellæa glauca.*

P. gracilis (slender). A synonym of *Pellæa gracilis.*

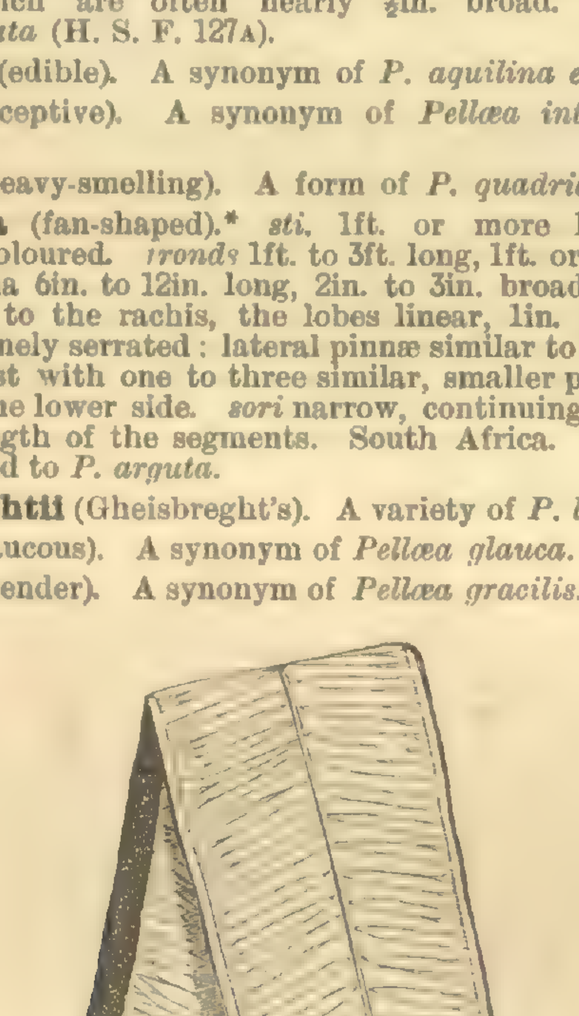

FIG. 309. PINNA OF PTERIS GRANDIFOLIA.

Pteris—*continued.*

P. grandifolia (large-fronded). *sti.* 6in. to 12in. long, erect, straw-coloured, clothed below with rusty-woolly scales. *fronds* 1ft. to 2ft. long, simply pinnate; pinnæ linear, erecto-patent, entire, sessile or the lower ones stalked, the lower ones 6in. to 12in. long, hardly 1in. broad. *sori* often continuous along the whole length of the pinnæ. Tropical America. See Fig. 309. (H. S. F. 113B.) SYN. *Litobrochia grandifolia.* The variety *vittata* has nearly free veins.

P. hastata (spear-shaped), of Thunberg. A synonym of *Pellæa calomelanos.*

P. heterophylla (variable-fronded).* *sti.* wiry, slender, erect, straw-coloured. *fronds* 6in. to 12in. long, 3in. to 6in. broad, ovate-deltoid, tripinnate; pinnæ all, except two or three of the highest, compound, the lowest deltoid, with the pinnules again pinnatifid; ultimate segments of the barren frond ovate, sharply and deeply toothed, cuneate and entire at base, about ½in. long, ¼in. broad, those of the fertile frond about ⅜in. long, ⅛in. broad, the tip sterile and toothed. Involucres broad, pale, membranous. West Indies and Brazil, 1820. (B. M. 4925.)

P. Hookeriana (Hooker's). *sti.* 6in. to 12in. long, erect, pale. *fronds* 9in. to 12in. long, 6in. to 9in. broad, with a long, linear, entire, terminal pinna; lateral pinnæ two to six pairs, sessile, opposite, entire, the largest about 6in. long and ⅔in. broad, the lowest forked at the base. *sori* slightly intramarginal; involucres narrow, brownish. Ceylon.

FIG. 310. CENTRAL PINNA OF PTERIS LEPTOPHYLLA.

P. incisa (cut). Bat's-wing Fern. *sti.* stout, erect, straw-coloured or bright brown. *fronds* several feet long, bi- or tri-pinnate; uppermost pinnæ simply pinnate, with entire, linear-oblong pinnules; the next with numerous pinnatifid pinnules, 2in. to 3in. long, about ⅔in. broad, in opposite pairs, the lowest often quite close to the stem, reduced in size, and their segments dilated; lowest pinnæ often very large and compound. *sori* interrupted or continuous, often reaching the points of the segments. Tropics, &c., 1823. Greenhouse. SYNS. *P. Vespertilionis, Litobrochia Vespertilionis.* In the form *aurita*, the lowest pair of pinnules are quite simple, and closely adpressed to the stem at the base of the pinnæ.

P. Kingiana (King's). A variety of *P. tremula.*

P. Kunzeana (Kunze's). *sti.* 3ft. long, strong, erect, straw-coloured or reddish-brown. *fronds* ample; terminal pinna 1ft. long, 3in. broad, cut down two-thirds of the way to the rachis into numerous linear, falcate, sharp-pointed lobes, which are slightly spinulose-serrate when barren; lateral pinnæ in numerous, nearly

Pteris—*continued.*

opposite pairs, the lower ones stalked, equalling or exceeding the terminal one and similarly pinnatipartite; lowest pair of pinnæ large, deltoid, compound below, with smaller, similar pinnules. *sori* falling short of the tips of the segments. Tropical America. (H. S. F. 139.) SYN. *Litobrochia Kunzeana.*

P. laciniata (torn). *sti.* 1ft. or more long, stout, erect, very hairy. *fronds* 2ft. to 4ft. long, 1ft. to 2ft. broad, deltoid, tripinnatifid, the upper part not cut down to the rachis, with oblong, entire lobes, ½in. to ¾in. long, ⅜in. broad; lower pinnæ 1ft. to 1½ft. long, 6in. to 9in. broad, with numerous lanceolate pinnules on each side, which are cut down to a broadly-winged rachis into lobes about ¼in. long and ¼in. broad; rachis and both surfaces hairy. *sori* lateral in the ultimate lobes, but not reaching the apex. West Indies. (H. S. F. 132B.) *P. Gheisbreghtii* is a less hairy, Mexican variety.

P. leptophylla (slender-fronded).* *sti.* 6in. to 9in. long, erect, firm, straw-coloured. *fronds* 9in. to 12in. each way, deltoid; a few of the upper pinnæ simple, the largest of these under 1in. long, ⅛in. broad, decurrent at base, strongly spinulose-serrate when barren; central pinnæ lanceolate, caudate, pinnatifid, with numerous similar pinnules; lowest pinnæ deltoid, with pinnules often 2in. long, and again pinnatifid. *sori* not reaching the tips of the segments. Brazil, 1824. See Fig. 310. (H. G. F. 23.) SYN. *Litobrochia leptophylla.*

Pteris—*continued.*

pinnæ 1ft. long, very compound. *sori* not reaching the points of the segments. New Zealand. A well-marked species. SYN. *Litobrochia macilenta.*

P. macroptera (large-winged). *sti.* 1ft. or more long, naked, erect, straw-coloured or brownish. *fronds* 2ft. or more long, 1ft. to 1½ft. broad, cut nearly to the rachis in the upper part into numerous linear lobes, the lowest of which are 6in. to 9in. long and ½in. broad, with about 1in. between them at the base, the point gradually narrowed and very faintly toothed when barren; lateral pinnæ few, often only a single pair, like the terminal one, but smaller. *sori* not reaching the tips of the segments. Brazil. SYN. *Litobrochia macroptera.*

P. Milneana (Milne's). *sti.* strong, erect, yellowish-brown. *fronds* 2ft. to 3ft. long, with numerous pinnæ on each side, cut down throughout nearly to the rachis into linear-oblong, falcate lobes, ½in. to ¾in. long; lowest pinnæ 6in. to 9in. long, 1in. to 1½in. broad, with a single similar, but smaller, pinnule at the base on the lower side. *sori* falling short of the sub-entire tips. Solomon Isles, 1865. SYN. *P. tripartita* var. (H. S. F. 138B).

P. moluccana (Moluccan). *sti.* strong, erect, dark brown. *fronds* 2ft. to 3ft. long, oblong, simply pinnate; pinnæ in numerous, nearly opposite pairs, linear, cuneate at base, spinulose-serrate towards the point, the largest 1ft. to 1½ft. long, ½in. to ¾in. broad. Involucres narrow, membranous. Malayan and Solomon Isles, 1880. (H. S. F. 112B.)

FIG. 311. PTERIS QUADRIAURITA ARGYRÆA.

P. longifolia (long-fronded).* *sti.* 6in. to 12in. long, stout, erect, pale, scaly below. *fronds* 1ft. to 2ft. long, 4in. to 9in. broad, oblong-lanceolate, attenuated below; pinnæ sessile, often twenty to thirty on each side, 3in. to 6in. long, ⅛in. to ¾in. broad, linear, entire, truncate or cordate, or sometimes slightly auricled at base; rachis sometimes scaly. Involucres yellowish-brown, membranous. Tropics, 1770.

P. longipes (long-stalked). *sti.* 1ft. to 2ft. long, erect, straw-coloured. *fronds* tripartite; terminal pinna about 6in. long, 1in. broad, with numerous erecto-patent, linear-oblong lobes, which are cut nearly to the rachis; lateral pinnæ numerous on each side, not more than 1in. apart, the longest simple one about 6in. long, the lowest compound, sometimes nearly as large as the central portion of the frond, 1ft. long, 6in. broad. *sori* falling short of the tips of the segments. India. SYN. *P. pellucens.*

P. macilenta (thin). *sti.* 6in. to 12in. long, straw-coloured, brownish below. *fronds* 1ft. to 3ft. long; terminal pinna 4in. to 8in. long, cut down nearly to the rachis into several deeply-sinuated and toothed, oblong lobes on each side; lateral pinnæ numerous, the upper ones 2in. apart at the base, cut down to the rachis below into deeply-lobed, deltoid pinnules; lower

P. mutilata (mutilated). *sti.* slender, erect, bright brown or straw-coloured, those of the fertile frond longest (9in. to 12in.) and strongest. *fronds* about 6in. each way, deltoid, with a linear, entire point, several entire pinnæ, but the lowest pair lanceolate-deltoid, 4in. to 6in. long, 3in. to 4in. broad, with several linear, erecto-patent pinnules on each side; divisions of the barren frond shorter and broader than those of the fertile one, not serrated, but mucronate at the point, and cartilaginously bordered. Involucres narrow, membranous. West Indies. (H. S. F. 131A.) *P. concinna* is, according to Mr. Baker, a more compound form than usual.

P. nemoralis (grove-loving). A form of *P. biaurita.*

P. paleacea (scaly). *sti.* 2ft. to 4ft. long, strong, erect, reddish-brown or straw-coloured, brown-scaly, becoming muricated. *fronds* 1ft. or more each way; terminal pinna 6in. to 9in. long, 1½in. broad, consisting of numerous contiguous, falcate, linear lobes, 1in. or more long, blunt, not serrated; lateral pinnæ similar, closely placed (not 1in. apart at base), imbricated, the

Pteris—*continued.*

lowest with several large similar pinnules from the under side; rachises scaly. *sori* extending along the whole length of the edge. St. Helena.

P. palmata (hand-shaped).* *sti.* 1ft. or more long, erect, chestnut-brown. *fronds* 4in. to 9in. each way; barren ones with a broad, undivided centre, and five or more triangular lobes, of which the terminal one is the largest, the lowest deflexed, and the sinuses rounded; fertile fronds cut down to a broadly-winged centre into linear lobes, of which the upper ones are entire, and the lower ones again cut on the lower side, the longest entire ones 3in. to 4in. long, ¼in. to ⅜in. broad; costæ black. *sori* continued to the tips of the segments. Tropical America, 1821. (H. G. F. 22.) SYNS. *P. collina, Doryopteris palmata.*

P. patens (spreading).* *sti.* 1ft. or more long, erect, chestnut-brown. *fronds* 3ft. to 4ft. long, 2ft. or more broad; terminal pinna 6in. to 9in. long, 1½in. to 2in. broad, with several narrow-linear lobes on each side, which are widened suddenly on both sides within a short distance of the base, the barren ones slightly serrated; lateral pinnæ numerous, similar, but larger, sometimes 1½ft. long, 2in. broad, the lowest forked. *sori* continued nearly to the ends of the segments. Ceylon, &c. (H. S. F. 137.) SYN. *P. decussata.*

P. pedata (footed).* *sti.* blackish, those of the barren fronds 3in. to 4in. long. *fronds*, barren ones 1in. to 2in. each way, with an almost entire, triangular apex, and a bluntly-divided, lateral lobe on each side; fertile ones 4in. to 6in. each way, cut nearly to the rachis into several pinnæ on each side, of which the upper ones are linear and entire, 1in. to 1½in. long, the lowest pair much larger than the others, and with several pinnules on the under side, the lowest of which are again pinnatifid; costæ dark-coloured. *sori* reaching the tips of the segments. Tropical America. (B. M. 3247.) SYN. *Doryopteris pedata.*

P. pellucens (pellucid). A synonym of *P. longipes.*

P. podophylla (duck's-foot-fronded). *sti.* 4ft. or more long, ½in. to ⅔in. thick at base, muricated below, straw-coloured. *fronds* ample, ternately divided; terminal pinna 6in. or more long, 1in. to 1½in. broad, cut two-thirds of the way to the rachis into numerous linear-oblong, falcate lobes, which are finely spinulose-serrate when barren; lateral pinnæ in numerous, closely-placed, nearly opposite pairs, 6in. to 9in. long, 1in. to 1½in. broad, with numerous lobes similar to those of the terminal one; lateral divisions of the frond like the terminal one, but smaller. *sori* continuous, falling short of the tips of the segments. West Indies, &c. (H. G. F. 55.) SYN. *Litobrochia podophylla.*

P. pungens (prickly). *sti.* 1ft. or more long, pale or brownish, prickly. *fronds* 1ft. to 2ft. long, 1ft. to 1½ft. broad; terminal pinna sometimes 1ft. long, upwards of 2in. broad, with a long, entire point, and numerous close, parallel, linear-oblong lobes, 1in. to 1½in. long, which extend nearly to the rachis, and are finely toothed towards the point when barren; lateral pinnæ similar to the terminal one, the lowest 2in. to 3in. below the next above it, once-forked, with a smaller, similar pinnule. *sori* not reaching the apices of the segments. West Indies. If the muricated stipe be not of a permanent character, this cannot, according to Mr. Baker, be regarded as distinct from *P. quadriaurita.*

P. pyrophylla (Pyrus-fronded). A form of *P. quadriaurita.*

P. quadriaurita (four-eared).* *sti.* 1ft. to 2ft. long, strong, erect, straw-coloured or brownish. *fronds* 6in. to 3ft. long, 4in. to 12in. or more broad; terminal pinna cut nearly to the rachis into numerous close, parallel, linear-oblong lobes, ½in. to 1in. long, the barren ones entire or slightly serrated; lateral pinnæ 6in. to 12in. or more long, 1in. to 2in. broad, the lowest 1in. to 2in. apart at the base, usually again compound, with one or two similar, but smaller, pinnules branching from them at the base on the lower side. *sori* often continuous along the whole margin of the segments. Tropics. The following are regarded, by Mr. Baker, as mere forms of this species: *P. argyræa*, a variety with a more or less distinctly marked band of white down the centre of the frond (see Fig. 311); *P. felosma, P. pyrophylla, P. sulcata.*

P. q. tricolor (three-coloured). A synonym of *P. aspericaulis tricolor.*

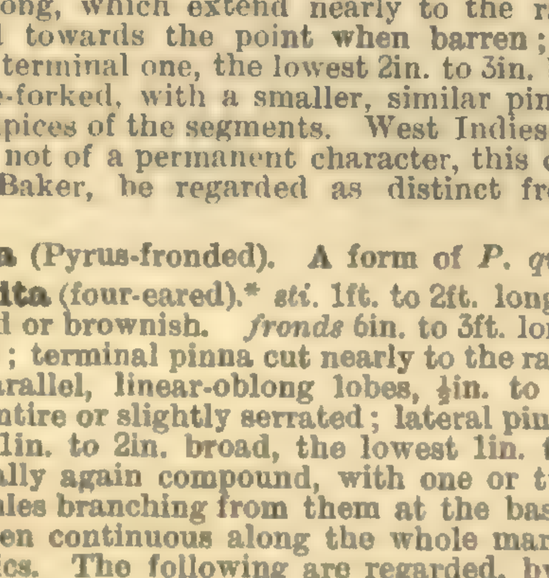

FIG. 312. LOWER PORTION OF FROND OF PTERIS SAGITTIFOLIA.

Pteris—*continued.*

P. sagittata (arrow-shaped). This name is applied to a form of *Pellæa cordata.*

P. sagittifolia (arrow-fronded).* *sti.* 4in. to 6in. long, erect, blackish. *fronds* 4in. to 6in. long, 2in. to 3in. broad, hastate-lanceolate or sub-triangular, the basal lobes triangular, acuminate, directed downwards, the margins entire, midrib blackish. *sori* continued all round the margin. Venezuela to Brazil. See Fig. 312. (H. E. F. 39.) SYN. *Doryopteris sagittifolia.*

FIG. 313. PINNA OF PTERIS SCABERULA.

P. scaberula (slightly scabrous).* *rhiz.* wide-creeping. *sti.* 6in. to 12in. long, strong, flexuous, bright reddish-brown, scabrous. *fronds* 1ft. to 1½ft. long, 6in. to 9in. broad, lanceolate or ovate-lanceolate, tri- or quadri-pinnatifid; lower pinnæ lanceolate-deltoid, 4in. to 9in. long, cut down to the rachis into numerous lanceolate pinnules on each side, which are again cut down into oblong, toothed segments, about ¼in. long. *sori* copious, when mature occupying nearly the whole segment, except the midrib. New Zealand. Greenhouse. See Fig. 313. (H. S. F. 93A.)

FIG. 314. LOWEST PINNA OF PTERIS SEMIPINNATA.

Pteris—*continued.*

P. semipinnata (half-pinnate). *sti.* 1ft. or more long, strong, erect, bright chestnut-brown. *fronds* 1ft. to 1½ft. long, 6in. to 9in. broad, ovate-lanceolate; upper part cut nearly to the rachis into numerous close, entire, linear lobes, the lowest of which are 1½in. to 3in. long; lower two-thirds of the frond with six or eight pairs of opposite, distantly-placed pinnæ, the largest of which are 3in. to 6in. long, with a long, linear, entire point, and a broad, entire wing on the upper side of the rachis, but the lower side with several linear pinnules, 1in. to 2in. long. Involucres membranous. East Indies, &c. See Fig. 314. (H. G. F. 59.)

P. serrulata (saw-edged).* Spider Fern. *sti.* 6in. to 9in. long, erect, wiry, pale or brownish. *fronds* 9in. to 18in. long, 6in. to 9in. broad, ovate, bipinnatifid; main rachis margined with a wing, which gradually narrows downwards; pinnæ in six or more distant, opposite pairs, the upper ones simple, often 4in. to 6in. long, ⅛in. to ¼in. broad, the lower ones with several long-linear, erecto-patent pinnules on each side, the edges of the barren ones spinulose-serrulate. Involucres narrow-membranous. China, 1770. Greenhouse. The following varieties of this species are enumerated by Mr. B. S. Williams:

P. s. angustata (narrow). An elegant form, with pinnæ very much narrower than in the type, and crested at each point.

P. s. Applebyana (Appleby's). A superb garden variety; pinnæ long and narrow, pendent, furnished with a much-divided and fringed tassel at all the points.

P s. corymbifera (corymb-bearing). This handsome variety is also of garden origin. It has erect fronds, with much-shortened pinnæ, forming dense, crisp, corymbiferous heads.

P. s. cristata (crested). An erect garden form, with the apex of each pinna beautifully crested.

P. s. c. semi-fastigiata (slightly fastigiate). The finest variety of all; it has a compact, dense habit, and forms a very large and broad-crested corymb at the apex; the lower portion of the frond is developed as in the normal form.

P. s. polydactyla (many-fingered). In this variety, the points of the pinnæ are several times forked or fingered, and frequently much lengthened out.

FIG. 315. PTERIS SERRULATA TENUIFOLIA, showing Habit and Portion of detached Frond.

P. s. tenuifolia (slender-fronded). A form with narrow pinnæ. See Fig. 315.

P. spinulifera (spine-bearing). A synonym of *P. atrovirens.*

P. Stelleri (Steller's). A synonym of *Pellæa gracilis.*

P straminea (straw-coloured). *sti.* 1ft. to 1½ft. long, and, as well as the rachis, stramineous. *fronds* narrow-deltoid, 1ft. to 1½ft. long; pinnæ ascending, the lowest much the largest, deltoid, with compound lower pinnules on both sides, the others lanceolate, 1½in. to 2in. broad, cut down to the rachis or a narrow wing; segments lanceolate, narrowed to a point, the sterile ones sharply and closely dentate, upper ones growing gradually shorter. *sori* falling short of the tips of the segments. Chili. SYN. *P. crispa* (of gardens).

P. sulcata (furrowed). A form of *P. quadriaurita.*

P. tremula (trembling).* *sti.* 1ft. or more long, strong, erect, bright chestnut-brown. *fronds* 2ft. to 4ft. long, 6in. to 2ft. broad, the apex with a few, closely-placed, linear, entire lobes, which are obliquely decurrent at the base, the largest hardly more than 1in. long; upper pinnæ simply pinnate, with numerous similar lobes on both sides, the largest about 6in. long, above 1in. broad; lower pinnæ often very compound, sometimes 1ft. long and bipinnate. *sori* copious, sometimes filling up the whole segment

Pteris—*continued.*

except the midrib. Australia and New Zealand, 1820. Greenhouse. See Fig. 316. (H. S. F. 120B.) The variety *Kingiana* has its ultimate segments large, sometimes 1½in. long, nearly ¼in. broad, not toothed.

P. tricolor (three-coloured). A synonym of *P. aspericaulis tricolor.*

P. tripartita var. (thrice-parted). A synonym of *P. Milneana*

FIG. 316. PINNA OF PTERIS TREMULA.

P. umbrosa (shady).* *sti.* 1ft. to 1½ft. long, erect, bright reddish-brown. *fronds* 1ft. to 2ft. long, 6in. to 12in. broad, with a terminal pinna and usually six to nine lateral ones, all of which run down the stipe at the base, so as to form a broad wing, which reaches nearly or quite to the next node; upper pinnæ 3in. to 6in. long, ¼in. to ½in. broad, finely serrated in the sterile portions; lower ones forked, or with two or four erecto-patent, linear pinnules. Australia, 1823. Greenhouse. (H. S. F. 130B.)

P. undulata (waved). A variety of *P. comans.*

P. Vespertilionis (bat-winged). A synonym of *P. incisa.*

P. vittata (striped). A variety of *P. grandifolia.*

PTERIUM. A synonym of *Lamarckia.*

PTEROCARPUS (from *pteron*, a wing, and *karpos*, a fruit; the pods are girded by a broad wing). ORD. *Leguminosæ.* A genus comprising about fifteen species of unarmed, stove trees, inhabiting the tropical parts of Asia, Africa, and America. Flowers yellow, rarely mixed with violet and white, often showy, disposed in simple or paniculate, loose, axillary or terminal racemes; calyx turbinate at base; standard orbicular or broadly ovate; wings oblique, obovate or oblong; petals glabrous. Pods compressed, indehiscent, orbiculate or ovate, rarely oval-oblong. Leaves alternate, impari-pinnate; leaflets alternate or irregularly opposite, exstipellate. For culture of the under-mentioned species, *see* **Dalbergia.**

P. dalbergioides (Dalbergia-like). A synonym of *P. indicus.*

P. Draco (dragon). Dragon Gum-tree. *fl.* yellow, in paniculate racemes; panicles short, loose. May. Pods 1½in. in diameter. *l.*, leaflets 2in. to 4in. long, ovate or oblong, acuminate, shining. *h.* 30ft. Tropical America, 1820.

Pterocarpus—*continued.*

P. flavus (yellow). A form of *P. indicus.*

P. indicus (Indian). Burmese Rosewood. *fl.* yellowish; racemes axillary, simple or branched. May. Pods acutely mucronate. *l.*, leaflets from five to nine, alternate, acute, glabrous. *h.* 30ft. East Indies, 1813. (B. F. S. 23.) SYN. *P. dalbergioides. P. flavus* is regarded, by Bentham, as merely a form of this species.

P. Marsupium (pouched). *fl.* pale yellow, disposed in terminal panicles. April. *l.*, leaflets from five to seven, alternate, elliptic, somewhat emarginate, coriaceous, glabrous. *h.* 40ft. Coromandel, 1811. (B. F. S. 21; B. M. Pl. 81.)

P. Rohrii (Rohr's). *fl.* yellow, in simple or slightly-branched, tomentose racemes; pedicels shorter than the calyx. April. Pods sub-orbiculate, about 2in. in diameter. *l.*, leaflets very variable, five to nine, ovate or oblong, acuminate, glabrous, 3in. to 5in. long. *h.* 20ft. Tropical America, 1816.

PTEROCARYA (from *pteron*, a wing, and *caryon*, a nut; referring to the winged fruit). ORD. *Juglandeæ.* A small genus (three or four species) of hardy, deciduous trees, natives of temperate Asia. Flowers unisexual, monœcious, in long, pendulous spikes. Fruit drupaceous, dry, angled, having two wings as the ovary, much tapered at the tip, not opening. Leaves ample; leaflets often numerous, narrow. The species are seldom seen in gardens. They thrive best when planted near water; in such spots, *P. fraxinifolia* makes one of the most ornamental of deciduous trees. All the species are easily raised from seed, imported or ripened in this country.

P. caucasica (Caucasian). A synonym of *P. fraxinifolia.*

P. fraxinifolia (Ash-leaved).* Caucasian Walnut. *fl.* greenish. May. *l.*, leaflets about nineteen, ovate-oblong, acuminate, acutely serrate, glabrous. *h.* 20ft. to 40ft. Caucasus (in moist woods), 1800. SYN. *P. caucasica.*

P. rhoifolia (Rhœas-leaved). *fl.*, female catkins sub-terminal, loose-flowered, equalling or exceeding the leaves. *l.* eight or nine-jugate; leaflets sessile, rounded from the base, oblong-lanceolate, acuminate, argutely and densely serrulated, glabrous above, softly pubescent on the veins beneath, as well as on the petioles. Japan. (S. Z. F. J. 150.)

P. stenoptera (narrow-winged). *fl.*, females sessile; bracts minute, acute; wings linear-oblong, attenuated at apex. *l.* five-jugate, with a rudimentary odd leaflet; leaflets sessile, elliptic lanceolate, attenuated at base, obtuse at apex, serrated on the margins. China.

PTEROCEPHALUS. Included under **Scabiosa** (which *see*).

PTEROCHILUS. A synonym of **Microstylis** (which *see*).

PTEROCOCCUS. A synonym of **Calligonum** (which *see*).

PTERODISCUS (from *pteron*, a wing, and *discus*, a disk; referring to the broad wings of the disk of the fruit). ORD. *Pedalineæ.* A genus consisting of only three species of greenhouse, herbaceous plants, with tuberous roots, or with a thick, succulent stem, which becomes tall under cultivation; two are natives of South Africa, and the third is Angolan. Flowers purple or lurid-yellow, solitary in the axils, very shortly stalked or almost sessile; calyx small, five-parted; corolla tube gibbous at base, swollen upwards; limb somewhat bilabiate, with five broadly rotundate, spreading lobes. Leaves opposite or alternate, narrow, toothed or cut, rather thick, canescent. The only species worth growing is *P. speciosus.* This is a handsome plant, and thrives best under the influence of a full exposure to sunlight. It requires a compost of sandy loam and leaf mould. Propagated by seeds, sown in spring and autumn; and by dividing the plant, in spring. *P. luridus* requires similar treatment.

P. luridus (lurid). *fl.* dull yellow, tubular. July. *l.* linear-oblong, deeply lobed, almost pinnatifid. *h.* 1½ft. South Africa, 1868. A gouty-stemmed plant, of little horticultural value. (B. M. 5784.)

P. speciosus (showy).* *fl.* of a beautiful lilac or reddish colour, axillary, solitary, large, with a funnel-shaped tube, and a spreading, five-lobed limb. May. *l.* opposite, sinuate, dentate. Stem branching into several erect, thick branches. Roots large, globose, tuberous, the upper part elevated above the earth. *h.* 2ft. South Africa, 1848. (B. M. 4117.)

PTEROLOBIUM (from *pteron*, a wing, and *lobos*, a pod; the pods are produced into a wing at the extremity). SYNS. *Quartinia, Reichardia.* ORD. *Leguminosæ.* A genus comprising four species of tall, climbing, stove shrubs, armed with recurved prickles; they are natives of tropical Asia, Africa, and Australia. Flowers white (or yellowish?), small, racemose; racemes at the tips of the branches, loosely paniculate; calyx segments five, imbricated; petals five, spreading, imbricated. Pods sessile, compressed, samaroid, indehiscent, the apex produced into an oblique, oblong or falcate wing. Leaves bipinnate; leaflets small, numerous; stipules small or inconspicuous; bracts very caducous. *P. indicum*—the only species introduced—requires culture similar to **Cæsalpinia** (which *see*).

P. indicum (Indian). *fl.* yellowish, axillary only from the extreme leaves, which gives them an appearance of a large, terminal, leafy panicle. *l.* alternate, abruptly bipinnate, 5in. to 6in. long, 3in. broad; pinnæ opposite, four to eight pairs, oval, entire, smooth, ½in. long, ¼in. broad; petioles armed with three prickles. East Indies. SYN. *Cæsalpinia lacerans.*

PTEROLOMA. Included under **Desmodium** (which *see*).

PTERONEURUM (from *pteron*, a wing, and *neuron*, a nerve; referring to the winged placentas). ORD. *Cruciferæ.* A small genus of rock plants, included, by the authors of the "Genera Plantarum," under **Cardamine** (which *see* for culture of the species described below).

P. carnosum (fleshy). *fl.*, calyx spreading; corolla twice as long as the calyx; petals white, obovate. June. *l.*, segments ovate, sub-emarginate, glaucescent. *h.* 3in. Eastern Europe, &c., 1824. Hardy perennial.

PTEROPHYLLUS. A synonym of **Ginkgo** (which *see*).

PTEROPHYTON. A synonym of *Actinomeris.*

PTEROPSIS. Included under **Tænitis** (which *see*).

PTEROSPERMUM (from *pteron*, a wing, and *sperma*, a seed; referring to the seeds being winged). SYN. *Velaga.* ORD. *Sterculiaceæ.* A genus comprising about fourteen species of stove, scaly or stellate-tomentose trees or shrubs, natives of tropical Asia. Flowers often elongated, sometimes several inches long; calyx tubular, five-cut or parted, deciduous; petals five, obovate, oblong, or linear, deciduous; peduncles axillary, short, one or few-flowered. Leaves coriaceous, often oblique, entire or the uppermost ones angularly toothed, penninerved, and three to seven-nerved at the base. The species best known to cultivation are those described below. They thrive in a compost of sandy, fibry loam and lumpy peat; and perfect drainage is most essential. Propagated by cuttings of half-ripened side shoots, cut close to the stem, and inserted in sand, in bottom heat.

P. acerifolium (Maple-leaved). *fl.* white; pedicels shorter than the petioles. July to September. *l.* broad, peltately-cordate, obtuse, with a short acumen, toothed, tomentose beneath, upper surface white, clothed with stellate hairs. East Indies, 1790. A large tree. This species thrives well under greenhouse treatment. (B. M. 620.)

P. suberifolium (Cork-tree-leaved). *fl.* white, axillary, solitary, twin or tern at the tops of the branches; pedicels hardly the length of the petioles, crowded. *l.* oblong, acuminate, obliquely cordate at the base, coarsely toothed at the apex, tomentose beneath. East Indies, 1783. A small tree. (B. M. 1526.) SYN. *Pentapetes suberifolia.*

PTEROSTELMA. Included under **Hoya** (which *see*).

PTEROSTYLIS (from *pteron*, a wing, and *stylis*, a column; alluding to the broadly-winged column). SYN. *Diplodium.* ORD. *Orchideæ.* A genus comprising about three dozen species of greenhouse, terrestrial orchids, with small, underground tubers; six are confined to New Zealand, and the rest are all Australian, one being also found in New Zealand and another in New Caledonia. Flowers usually green, often tinged or streaked with red or brown, large and solitary, or smaller and racemose, on short pedicels; dorsal sepal broad, erect, in-

Pterostylis—*continued.*

curved, and very concave; petals lanceolate-falcate, curved under the dorsal sepal, and forming with it an arched or almost hood-shaped upper lip or helmet; lateral sepals more or less united in a two-lobed lower lip, the lobes often terminating in long points; lip on a short claw at the end of the basal projection of the column; column elongated within the galea, and curved with it. Radical leaves ovate, tufted; cauline ones linear or lanceolate, or reduced to sheathing scales. The under-mentioned species, which are those best known to gardeners, thrive in leaf mould, lightened by the admixture of a little sand. Before putting in the soil, the pots should be one-third filled with broken crocks. Propagated by divisions. Except where otherwise stated, all the species here described are Australian.

P. acuminata (taper-pointed). *fl.* green; galea 1in. to 1¼in. long, usually produced into a point; lip oblong-linear, tapering to a point; scape one-flowered, 6in. to 9in. high. April. *l.* in a radical rosette, ovate or broadly elliptical, and five or seven-nerved. *h.* 6in. 1827. (B. M. 3401; F. A. O., Part 5.)

P. Banksii (Banks'). *fl.* green, solitary, 2in. to 3in. long; upper sepal arched forward, the lateral ones produced into long, slender tails; lip linear, the tip exserted. April. *l.* numerous, alternate, sheathing the whole stem, rising above the flower, narrow linear-lanceolate, acuminate. *h.* 6in. to 18in. New Zealand, 1832. (B. M. 3172.)

P. Baptistii (Baptist's).* *fl.* green, marked with white and brown, solitary, and adorned with two bristle-like antennæ. Winter. *l.* rosulate, basilar, petiolate, oblong-cuneate, the upper ones ascending the rachis. *h.* 1ft. 1877. (B. M. 6351; G. C. n. s., ix. 213.)

P. curta (short-lipped). *fl.* green; galea erect, about 1¼in. long, acute, but not acuminate, the lower lip cuneate, with two broadly-lanceolate lobes; lip linear, rather longer than the column; scapes one-flowered, usually about 6in. high. October. *l.* in a radical rosette, usually on long petioles, ovate or broadly elliptical, five to nine-nerved, from under 1in. to 1½in. long. 1829. (B. M. 3086; F. A. O., Part 5.)

P. nutans (nodding). *fl.* green; galea nearly 1in. long, much curved near the base, and again towards the end, so as to give the flower a nodding appearance, the lower lip shortly and broadly cuneate; lip oblong-linear, obtuse, sometimes minutely ciliated; scape one-flowered, 6in. to 12in. high. September. *l.* in a radical rosette, petiolate, ovate or elliptical, ½in. to 1½in. long. 1826. (B. M. 3085.)

PTEROSTYRAX. A synonym of **Halesia** (which *see*).

PTEROTA. A synonym of **Zanthoxylum** (which *see*).

PTEROZONIUM. Included under *Gymnogramme.*

PTERYGOCALYX. A synonym of *Crawfurdia.*

PTERYGODIUM (from *pterygodes*, wing-like; alluding to the appearance of the sepals). Monk's-cowl Orchid. ORD. *Orchideæ.* A genus comprising about half-a-score species of greenhouse, leafy, terrestrial, South African orchids. Flowers spicate, few or solitary; dorsal sepal connivent with the petals, and more or less coherent; lip adnate to the base of the column, and furnished with a large, tongue-formed appendage at its base. Probably none of the species are now in cultivation.

PTILOCNEMA. A synonym of **Pholidota** (which *see*).

PTILOMERIS (from *ptilon*, a feather, and *meris*, a part; alluding to the fringed, chaffy scales of some of the species). SYN. *Hymenoxys.* ORD. *Compositæ.* A small genus (about three species) of hardy, annual, Californian herbs, regarded, by Bentham and Hooker, as synonymous with *Actinolepis.* Flower-heads yellow, pedunculate at the tips of the branches; ray florets in one series, ligulate, two or three-toothed; involucral bracts one-seriate; receptacle convex or conical, naked or very slightly bristly; achenes linear. Leaves opposite, or the upper ones rarely nearly all opposite, remotely toothed, incised, or once or twice pinnatifid. *P. coronaria*, the only species calling for mention here, may be treated as other hardy annuals.

Ptilomeris—*continued.*

P. coronaria (crowned). *fl.-heads*, ray florets oblong; involucral scales lanceolate; receptacle pilose. June. *l.* mostly opposite, the divisions capillary. *h.* 1ft. 1838. Plant branched from the base, minutely puberulent. SYN. *Hymenoxys californica* (B. M. 3828).

PTILOTRICHUM. Included under *Alyssum.*

PTYCHOSPERMA (from *ptyche*, a fold or winding, and *sperma*, a seed; referring to the ruminated albumen). Australian Feather-palm. SYN. *Seaforthia.* ORD. *Palmæ.* A genus of elegant, unarmed, stove palms, usually with tall trunks. About a dozen species have been enumerated, natives of tropical Australia, New Guinea, and the Pacific Islands. Flowers usually rather small; complete spathes two, caducous; spadix with spreading, often slender, branches. Fruit ovoid or ellipsoid, sometimes beaked, terete or sulcate, one-seeded, the albumen more or less ruminated. Leaves terminal, equally pinnatisect; segments thickened on the margins, præmorse, the terminal one confluent; sheaths elongated. The species thrive best in fibrous loam, leaf mould, and sand. Thorough drainage, and an abundant supply of water, are important points in their culture. Propagated by seeds.

P. Alexandræ (Alexandra's). *l.* pinnate, beautifully arched, quite red when young, but light green when mature; rachis smooth. Stems rather slender. *h.* 70ft. to 80ft. Queensland, 1870. A very elegant species, rare in cultivation. (F. d. S. 1916.) *Archontophœnix Alexandræ* is now the proper name of this plant.

FIG. 317. PTYCHOSPERMA CUNNINGHAMIANA.

P. Cunninghamiana (Cunningham's).* Illawarra Palm. *l.* 2ft. to 10ft. long; pinnæ lanceolate, narrow, unequally bifid at the

Ptychosperma—*continued.*

apex, 1ft. to 1½ft. long, dark green; petioles broadly sheathing at the base. Stem somewhat stout, straight. *h.* about 60ft. Queensland and New South Wales. A very elegant species, and a most useful conservatory or cool greenhouse plant. See Fig. 317. SYNS. *Archontophœnix Cunninghamiana* (this name is the correct one), *Seaforthia elegans* (B. M. 4961).

P. Kuhlii (Kuhl's). A synonym of *Pinanga Kuhlii.*

P. Macarthurii (MacArthur's). *l.* pinnate; leaflets arching, linear-oblong, truncate or oblique, and unequally toothed at apex, 4in. to 8in. long. New Guinea, 1879. An elegant and distinct palm. SYN. *Kentia Macarthurii.*

P. Normanbyi (Normanby's). *fl.*, inflorescence ovoid, axillary. *fr.* ovoid, with a conical tip, about 1½in. long. *l.* 8ft. to 10ft. long. *h.* 40ft. to 60ft. Australia. SYNS. *Areca Normanbyi*, *Cocos Normanbyi.*

P. Rumphii (Rumph's). A synonym of *Drymophloeus oliviæformis.*

P. rupicola (rock-loving). A synonym of *Loxococcus rupicola.*

P. Seemanii (Seeman's).* *l.* pinnate; pinnæ erose-dentate, somewhat resembling those of a *Caryota* in appearance, and of a bright green colour. Stem, when fully developed, about 1in. in diameter, strong. Fiji Islands, 1879. An elegant, dwarf-growing species.

PUBERULOUS. Minutely pubescent.

PUBESCENT. Softly downy or hairy.

PUCCINIA (named after an Italian botanist, Puccini). A large genus of parasitic Fungi belonging to the order *Uredineæ.* In this order, the Fungi grow, with a doubtful exception or two, on living plants, into which they push their jointed mycelium. The reproduction is always effected by conidia, or spores, produced on branches from the mycelium, and never inclosed in larger cells, as in **Mould** or in **Pyrenomycetes** (which *see*). The conidia are usually crowded together in masses, which, for a time, are protected by the epidermis of the host-plant; but this generally becomes torn, and the conidia are exposed. The conidia are known to be of two, or even more, forms in almost all the species in the order, and these forms are usually very different from one another, affording very striking examples of the phenomenon called "pleomorphism." So different are they, that several genera were established on what are now known to be only forms of the same Fungi as had already received names under other forms; hence, much confusion has arisen, and this is only gradually being overcome by careful and exact observations. Even yet much doubt exists as to the true relationships of many of the species. An attempt will be made to render this part of the subject more clear by describing what is now generally accepted as the life-history of two or three of the more important species of the genus *Puccinia.* The various forms of conidia alternate with one another in the cycle of development of each species, and experiments have led to the belief that some species of *Puccinia* live on different host-plants in the different stages of the cycle.

The forms of reproductive organs met with in the most complete cycles in the genus, *e.g.*, that believed to exist in *P. graminis*, are three or four in number. The names employed to denote them were formerly given to them when they were regarded as different species, belonging to genera distinct from that now recognised as the more mature condition (viz., *Puccinia*). The forms are as follows:

1. The *Æcidium* (old generic name), or Cluster-cup, in the form of a cup, at first closed, afterwards open above. The sides of the cup (peridium) consist of a single layer of cells. The hollow is filled with closely-packed, erect branches, arising from the mycelium, each of which bears a chain or row of rounded, or angular, thin-walled, yellow cells, which separate from one another, and germinate readily, pushing out a mycelium thread. On a leaf of the host-plant, the mycelium pushes through a stoma, and produces the Fungus anew. The Cluster-cups usually stand, as the name denotes, in clusters, on thickened, discoloured tissues of the hosts, though, occasionally, they are scattered over the green parts without causing much discoloration. They generally stand on young stems and on the lower surface of leaves (see

FIG. 318. LEAVES OF BERBERIS VULGARIS COVERED WITH ÆCIDIUM BERBERIDIS (believed to be a stage in the development of *Puccinia graminis*)—*a*, Æcidium-patch on Leaf.

Fig. 318), but may be on the upper surface also. On the same mass of tissue as the cups, but, in general, on the other side of the leaf, small, flask-shaped spaces

FIG. 319. TRANSVERSE SECTION OF LEAF OF BERBERIS VULGARIS, showing Spermogonia and *Æcidium Berberidis*, magnified considerably—*a*, Æcidium Cup just opened; *b*, Thickened Tissue of Leaf; *c*, *c*, Æcidium Cups fully opened, with Spores dropping out; *e*, *e*, Skin of Leaf; *h*, *h*, Outer Coat of Æcidium Cups; *sp*, Spermogonia.

(spermogonia) open by narrow mouths (see Fig. 319). They are lined with branches of mycelium, bearing extremely small, rod-like bodies (spermatia), which do not seem to act as spores, and whose use to the Fungus is doubtful.

2. The *Uredo* (old generic name), is often developed on the same mycelium as the former, but later; it may grow only on a different host-plant. The uredospores are not inclosed in a cup, or peridium, but are formed on the surface of convex masses of mycelium. These masses are usually covered and protected by the epidermis of the host-plant till the spores are ripe, when the epidermis bursts. The spores are produced singly on erect branches (see Fig. 320), and, when ripe, fall off, and then are hardly to be distinguished from

Puccinia—*continued.*

æcidiospores. Like the latter, they germinate almost at once, and push their mycelium into the tissues of the host-plant through the stomata.

3. The *Teleutospore* (from *teleutaia*, final, and *spora*; so called because it is the final form in the cycle) is sometimes called the *Pucciniospore*; but this name is less suitable, as other genera besides *Puccinia* produce such spores. These are, in most cases, produced on the same substratum as the uredospores, but later in the season;

FIG. 320. GROUP OF SPORES OF PUCCINIA GRAMINIS—*a*, Uredospores, formed in early summer; *t*, Teleutospore, formed later in the season; *st*, Stalks supporting the Spores.

and they are most often developed only in late summer. They grow on erect footstalks or branches, to which they usually remain long united, and they are considerably thicker-walled and darker than the others, from which also they differ in form (see Fig. 320). They may be one-celled (*Uromyces*), two-celled (*Puccinia* and *Gymnosporangium*), or three- or more-celled (*Triphragmium* and *Phragmidium*). The teleutospores, for the most part, remain for a considerable time without germinating, often continuing unchanged all winter. On germinating

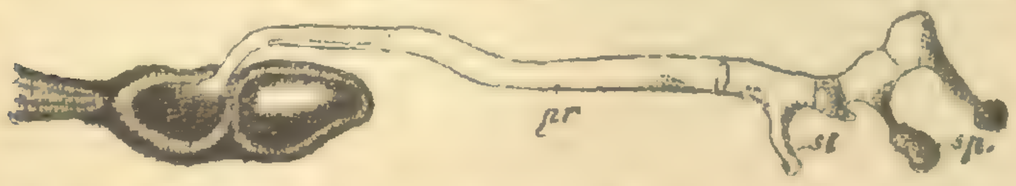

FIG. 321. PUCCINIA GRAMINIS—Teleutospore germinating and producing Sporidia (*sp*) on tips of small stalks (*st*); *pr*, Mycelium Tube growing out of the Spore.

(see Fig. 321), a mycelium tube is pushed out from each cell, or only from one. These tubes often become divided near the tip, by cross walls, into a row of cells, from each of which a small branch arises, and bears, at its tip, a small, rounded or oval body, called a sporidium. The sporidia produce a new mycelium, which penetrates into suitable host-plants, and frequently gives rise to æcidia in them. Occasionally, two forms of teleutospores occur in the same Fungus, *e.g.*, one-celled and two-celled in *Puccinia mixta*. In most of the species, the cycle is not so complete as the above; and, in fact, it has been traced, as yet, in but few species. As has already been said, most cryptogamic botanists believe that some of the species live, during part of the cycle, on one food-plant, and during the other part on another. Such species are said to be heterœcious (from *heteros*, different, and *oikos*, a home). Those that live on a single food-plant during the whole cycle are said to be autœcious (from *autos*, the same, and *oikos*).

Puccinia is readily distinguished, in the perfect condition, from other genera of *Uredineæ* by the teleutospores being free from one another and two-celled; or, at least, there are two-celled spores, associated, in a few species, with three- or more-celled abnormal exceptions, or with a one-celled form, much like the teleutospores of the allied genus *Uromyces*. The two-celled spores vary in length of stalks, in forms, and in surface-markings of the cells, &c.; and on these characters we must depend for distinguishing the species. The genus, in the systems in most frequent use on the Continent, is broken up into sections differing from one another in the completeness of the cycle, so far as known, and in other minor peculiarities.

Puccinia—*continued.*

Owing to the parasitic habit of the very numerous species included in the genus, there are few genera of Fungi more directly injurious; and a considerable number grow on and damage garden and field produce. The injurious effects are due, in some cases, to the abstraction of nourishment by the mycelium of the Fungus from the food-cells of the plant, and to the injury done to the epidermis by the spore-masses tearing it off the tissues beneath. These tissues, in consequence, cease to do their part in supplying food to the plant. In a smaller number of cases, the plant is stimulated by the Fungus to a local over-production of diseased cellular tissue. This is peculiarly the case in the æcidium stage, *e.g.*, on Barberry, on Gooseberry, and on Mints. In some cases, plants may suffer extremely, and may even be killed by the Fungi (*e.g.*, *P. Malvacearum* almost extirpated Hollyhocks in many districts a few years ago), or, if not killed, may be much distorted by them; *e.g.*, Mints attacked by the æcidium of *P. Menthæ*, Anemones bearing *P. Anemones*, &c. In many cases, the plants are simply weakened, without marked distortion; *e.g.*, cereals affected badly by the red and black rusts (*P. graminis* and *P. straminis*), and Onions overgrown by *P. mixta*. Some do not seem to injure very greatly the plants affected by them, but this is exceptional. Their growth and distribution are favoured by moisture, which promotes the formation and germination of the spores.

Remedies. As usual with internal parasites, no cure is known for plants, or parts of plants, attacked by these Fungi; hence, remedies must be directed to the prevention of the spread of disease. This is best accomplished by the removal and destruction of the infested structures, where this is possible. Where the attack is very serious, *e.g.*, in the case of Hollyhocks and of Onions, it is good policy to sacrifice the entire crop, if necessary, to preserve that of the following year from infection. As already said, moisture favours the distribution of the Fungi, and the soil should, therefore, be well drained. Lastly, where the hurtful Fungi are believed to be heterœcious, it is well to remove the supposed intermediate host-plant; *e.g.*, in the case of *Puccinia graminis* of cereals and other grasses, which is believed to live on Barberry-bushes as *Æcidium Berberidis*, the Barberries should be removed from the neighbourhood of the fields. Yet too much reliance must not be placed on this method, as these Fungi are known to thrive when restricted to the one food-plant.

In the following enumeration of the species of *Puccinia* falling under the observation of gardeners, those of which only teleutospores are known are first mentioned, and afterwards those of a more complex nature.

1. *P. Buxi* often forms dark, warty spots, in large numbers, on leaves of Box. Teleutospores alone are known. They are brown, smooth, and oblong or club-shaped. The Box does not, as a rule, seriously suffer.

2. *P. Malvacearum* is only too well known to most gardeners, because of its ravages on Hollyhocks, Mallows, and allied plants. For an account of the appearances produced, of the history of the Fungus, and of the injury done by it, *see* **Hollyhock Fungus.** Only teleutospores are known. They are pale brown, smooth, and pointed at both ends. The plants suffering from the growth of this Fungus seldom recover, and often die in a short time.

3. *P. Arenariæ* belongs to the same group, having, so far as is known, only teleutospores; these are pale yellowish-brown, and slender. They form small, brown masses, often in irregularly-concentric groups, on the leaves of Pinks, and of many wild, as well as garden, Caryophyllaceous plants; but, unless the Fungus is very abundant, the host-plant is seldom endangered by its growth.

Puccinia—*continued.*

4. *P. Grossulariæ* is described as having teleutospores of the ordinary type, and also as possessing an æcidium, known as *Æ. Grossulariæ*. The latter is very plentiful in some years, on discoloured spots on leaves and fruits of the Gooseberry, throughout Britain; but the *Puccinia* has not as yet been recorded as British. The relation of the two forms to one another cannot be yet assumed as fully proved. The æcidium does not, in general, do much harm to the leaves and branches; but, when it grows on the fruits, it renders them useless, and thus, in some years, destroys a considerable part of the crop. It causes the formation of thickened, orange-red patches in the parts affected; in these the cups occur. The patches are usually about ¼in. across. The teleutospores are elliptic or clavate, chestnut-brown, and covered with broad, low warts.

5. *P. mixta* has done very serious harm to Chives (*Allium Schœnoprasum*), and other species of *Allium*, including all, or nearly all, the cultivated forms of Onions. It has been observed as hurtful at Shrewsbury, and near Aberdeen. This species of *Puccinia* has spores of three forms present at one time, viz., a uredospore, formerly called *U. Alliorum*, and two forms of teleutospores—viz., one a Puccinia (two-celled), of oblong form; and the other one-celled, formerly known as *Uromyces Alliorum*. Both the latter forms are attached to long stalks, and both are smooth and brown.

6. *P. Menthæ* grows abundantly on the wild species of *Mentha*, and also on the garden Mints, and on various allied *Labiatæ*. This Fungus possesses all the three forms of spores. The æcidium often grows on the young shoots, and causes marked deformities and stoppage of growth in them; generally, it gives rise to long, dark red or purple patches on which the paler cups are scattered. The uredospores and the teleutospores form small masses, either irregularly scattered or in concentric arrangement. The former spores are pale brown, warty, and rounded; the latter are deep brown, and broadly elliptical with rounded ends.

7. *P. Gentianæ*, in 1885, proved very hurtful to *Gentiana acaulis*, in Kew Gardens, forming spots of teleutospores as in *P. Menthæ*. They resemble the spores of the latter species in form, but are smooth. The æcidium has not been observed in England.

The heterœcious species of *Puccinia* are of little importance to gardeners, since they do no harm to garden produce in the strict sense. To the systematic student of this group they are of the greatest interest, because of the many problems connected with their mode of life, and the careful and continued experiments required to permit of referring the various forms to their proper cycles. Much still remains to be done in this group. Several of them are found on grasses in their uredospore and teleutospore stages, but are believed to form their æcidia on other plants, usually on Dicotyledons. Others occur in the two former stages on Sedges (*Carex*), and in the latter on Dicotyledons. *P. graminis*, to which reference has already been made, is a well-known "rust" of cereals and of other grasses; its uredospores, formerly called *Uredo linearis*, being one of the "red rusts," and its teleutospores one of the "black rusts." Its æcidiospores are believed to be *Æcidium Berberidis*, frequently so common, in the form of orange-red patches, on the leaves of Barberries and of *Berberis Aquifolium*, in shrubberies and by roadsides. None of the other heterœcious species grow on garden plants, but mention is here made of one or two of the cycles that are now admitted, by those who accept heterœcism, as proved to occur among *Uredineæ*.

P. rubigo-vera. The uredospores (*Uredo rubigo-vera*) and teleutospores (*P. straminis*) form "rusts" on grasses; the æcidiospores (*Æ. asperifolii, Æ. lycopsodis*) live on many species of *Borragineæ*.

Puccinia—*continued.*

P. coronata. The uredospores and teleutospores occur on grasses, the æcidiospores (*Æ. Rhamni*) on species of *Rhamnus*.

P. poarum. The uredospores and teleutospores occur on *Poa annua*, *P. nemoralis*, and *P. pratensis*; the æcidiospores (*Æ. Tussilaginis*) on Coltsfoot (*Tussilago Farfara*).

P. Caricis. The uredospores (*U. Caricis*) and teleutospores (*P. striola*) occur on species of *Carex*; the æcidiospores (*Æ. Urticæ*) on Nettles.

P. silvatica. The uredospores and teleutospores live on certain species of *Carex*, the æcidiospores on Dandelion (*Taraxacum officinalis*).

PUCHA-PAT. A common Indian name for *Pogostemon Patchouli*.

PUDDING BERRIES. The edible fruits of *Cornus canadensis*.

PUERARIA (named in honour of M. M. N. Puerari, a botanical professor at Copenhagen). SYN. *Neustanthus*. ORD. *Leguminosæ*. A genus consisting of ten species of greenhouse, climbing herbs or sub-shrubs, natives of tropical Asia and Japan. Flowers blue or purplish, disposed on elongated, axillary peduncles, or sub-paniculate and fasciculately racemose at the apices of the branches; standard obovate or sub-orbiculate, the auricles inflexed, appendiculate; bracts small or narrow, very caducous. Pods elongated, two-valved. Leaves pinnately trifoliolate; leaflets ample, ovate or rhomboid, entire or sinuately trilobed, stipellate. The only three species introduced are those described below. For culture, *see* **Clitoria.**

P. Thunbergiana (Thunberg's). *fl.*, standard eight to nine lines long, equalling the keel; peduncles elongated, floriferous above the middle. Summer. *l.*, leaflets broadly rhomboid, or the lateral ones broadly and obliquely ovate, acuminate, entire or broadly sinuate-trilobed, often 4in. to 5in. in diameter. Khasia. A tall, greenhouse twiner. A fibre (used for textile purposes) is obtained from the stems, and a starch (largely used as an article of food by the Chinese and Japanese) from the roots, of this species.

P. tuberosa (tuberous). *fl.* bluish, borne on rather rigid peduncles in the upper nodes; pedicels very short; standard almost ½in. long, laterally reflexed. June. Pods 2in. to 3in. long. *l.*, leaflets 6in. to 12in. long, rhomboid or oblique, ovate; stipules ovate, subcordate. *h.* 3ft. India, 1806. Shrubby. SYN. *Hedysarum tuberosum*.

P. Wallichii (Wallich's). *fl.* reddish, borne on elongated, slender peduncles; pedicels slender; standard ¾in. long, the base ending in a short, narrow claw. June. Pods 3in. to 5in. long. *l.*, leaflets oblique, acuminate, entire; stipules lanceolate, very caducous. *h.* 3ft. India, &c., 1826. Shrubby.

PUFF-BALLS. *See* **Lycoperdon.**

PUGIONELLA. A synonym of **Strumaria** (which *see*).

PUGIONIFORM. Dagger-shaped.

PULEGIUM. A synonym of **Mentha** (which *see*).

PULLUS. Dusky-brown or blackish-coloured.

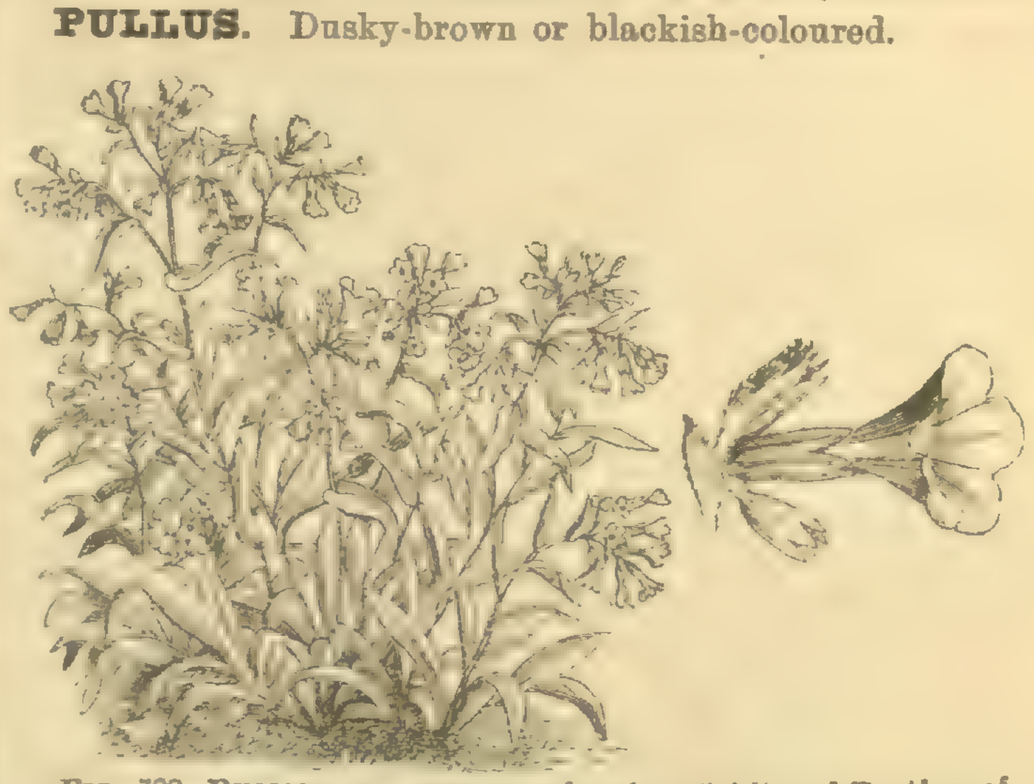

FIG. 322. PULMONARIA MOLLIS, showing Habit and Portion of detached Inflorescence.

PULMONARIA (from *pulmo, pulmonis*, a lung; the spotted leaves were supposed to resemble diseased lungs, and hence, by the "doctrine of signatures," a supposed efficacy in the disease was ascribed to the plants). Lungwort. ORD. *Borragineæ*. A genus comprising four species of hardy, perennial herbs, natives of Europe, and

FIG. 323. UPPER PORTION OF PLANT OF PULMONARIA OFFICINALIS.

mostly Western Asia. Flowers blue or rose-purple, pedicellate, disposed in terminal, bifid cymes; lower ones, or almost all, bracteate; calyx five-fid; corolla funnel-shaped, with a cylindrical tube and five imbricated, broad, obtuse, spreading lobes. Nutlets four, broad, erect. Leaves generally spotted with white; radical ones usually ample, petiolate; cauline ones few, alternate. The species are of easy culture in almost any moderately good garden soil. Propagated by dividing the clumps in early spring. Several species formerly included here are now referred to **Mertensia** (which *see*).

FIG. 324. PULMONARIA SACCHARATA, showing Habit and detached Inflorescence.

P. angustifolia (narrow-leaved).* Blue Cowslip. *fl.* at first pink, but ultimately bright blue; racemes twin, capitate. Spring. *l.* oblong-lanceolate or lanceolate, clothed with soft, down-like hairs. *h.* 1ft. Europe (Britain). (Sy. En. B. 1097.)

P. mollis (soft). *fl.* blue; calyx rather longer than the tube of the corolla. April and May. *l.*, radical ones elliptic-lanceolate

Pulmonaria—*continued.*

or lanceolate, decurrent into the broadly-winged petiole; cauline ones ovate-lanceolate, semi-amplexicaul. *h.* 9in. Europe, Siberia, &c., 1805. See Fig. 322. (B. M. 2422.)

P. officinalis (officinal). Sage of Bethlehem, &c. *fl.* red at first, then violet, terminal. Spring. *l.* scabrous, radical ones ovate-cordate, cauline ones ovate-oblong, sessile, spotted with white. *h.* 1ft. Europe, &c. (Britain). See Fig. 323. (Sy. En. B. 1098.) There is a white-flowered form of this species.

P. saccharata (sugared).* *fl.* pink. June. *l.*, radical ones oval, acuminate at both ends, decurrent at base into the short petioles; cauline ones sessile, ovate-oblong. *h.* 1ft. Europe, 1817. See Fig. 324.

PULSATILLA. *See* **Anemone Pulsatilla.**

PULTENÆA (probably named after Dr. Richard Pulteney, 1730-1801, author of "Historical and Biographical Sketches of the Progress of Botany in England, from its Origin to the Introduction of the Linnæan System," and other works of merit). Including *Euchilus* and *Spadostyles*. ORD. *Leguminosæ*. A genus comprising seventy-five species of ornamental, greenhouse, evergreen shrubs, confined to Australia. Flowers yellow, orange, or mixed with purple, axillary and solitary, or crowded in terminal heads, and surrounded within the floral leaves by imbricated, scarious, brown bracts or enlarged stipules without any lamina; two upper lobes of calyx more or less united into an upper lip; petals on rather long claws; standard nearly orbicular; wings oblong; keel incurved; stamens free. Pods ovate, flat or turgid, two-valved. Leaves opposite or rarely ternately whorled, simple, sometimes flat or with revolute margins, sometimes concave or with incurved margins; stipules linear-lanceolate or setaceous, brown and scarious. Pultenæas succeed best in fibrous peat, to which about one-seventh part of silver sand should be added. They require, like many other hard-wooded Australian plants, firm potting, and very careful watering with soft water. Propagated by imported seeds; and from cuttings, made of the points of shoots when about three parts matured. The latter should be inserted in very sandy peat, covered with a bell glass, placed in an intermediate temperature, and kept well shaded. In the following species, the flowers are yellow, except where otherwise stated.

P. argentea (silvery). A synonym of *P. dentata*.

P. cordata (heart-shaped). A synonym of *P. juniperina latifolia*.

P. daphnoides (Daphne-like). *fl.* shortly pedicellate, in dense, terminal, sessile heads; standard nearly twice as long as the calyx. June and July. *l.* cuneate-oblong, flat, glabrous, nearly 1in. long, ending in a pungent mucrone. *h.* 2ft. to 3ft. 1792. (A. B. R. 98; B. M. 1394; L. B. C. 1143.)

P. d. obcordata (obcordate). *l.* shorter and broader, more truncate, with a more prominent point. (A. B. R. 574, under name of *P. obcordata*.)

P. dentata (toothed). *fl.* in dense, terminal heads, sessile within the last leaves; calyx silky-villous, half as long as the standard. June. *l.* linear, linear-oblong, or narrow-lanceolate, usually narrow at both ends, ¼in. to ½in. long, darker-coloured or silvery beneath. *h.* 2ft. 1820. SYN. *P. argentea*.

P. euchila (beautiful-lipped). *fl.* axillary, on pedicels ¼in. long; petals half as long again as the calyx. May. *l.* linear-cuneate, obtuse, ¼in. to ¾in. long, flat or slightly concave, dark or silvery beneath. *h.* 1ft. 1824. SYN. *Spadostyles Sieberi*.

P. flexilis (bending). *fl.* solitary in the upper axils, shortly pedicellate; standard fully twice as long as the calyx. May. *l.* linear or linear-oblong, often slightly cuneate, obtuse or mucronate, ¼in. to 1in. long, flat or concave, darker-coloured beneath. *h.* 1½ft. 1801. (B. R. 1694.)

P. juniperina (Juniper-like). *fl.* in the uppermost axils, usually two or three together at the ends of the smaller branches, with occasionally one or two leafless, stipular bracts; standard fully twice as long as the calyx. June. *l.* linear or lanceolate, spreading, rigid and pungent-pointed, less than ¼in. long, concave or with involute margins. *h.* 1½ft. 1824. Plant prickly.

P. j. latifolia (broad-leaved). *l.* lanceolate, rounded or sometimes almost cordate at base, tapering into a rigid, pungent point. 1832. SYN. *P. cordata* (B. M. 3443).

P. mucronata (pointed). A synonym of *P. polifolia*.

P. obcordata (obcordate).* *fl.* in the upper axils, or forming a short, terminal, leafy head; standard half as long again as the pubescent calyx. April. *l.* opposite, in whorls of three or

Pultenæa—*continued.*

scattered, broadly obovate or obcordate, about ⅛in. long, obtuse, truncate, or emarginate, pubescent when young, at length nearly glabrous. *h.* 2ft. 1803. (B. R. 403 and L. B. C. 60, under name of *Euchilus obcordatus.*)

P. paleacea (scaly). *fl.* in dense, but not large, terminal heads, sessile within the last leaves; calyx silky-hairy, the standard nearly twice as long, the lower petals shorter May. *l.* linear, with fine, straight or recurved points and revolute margins, ½in. to ¾in. long, pale, and usually silky-hairy beneath. *h.* 1½ft. 1789. (L. B. C. 291.)

P. pedunculata (long-flower-stalked). *fl.* small, solitary or two together at the ends of the branchlets, on filiform pedicels longer than the leaves; standard twice as long as the calyx. May. *l.* linear or oblong-lanceolate, narrowed at both ends, the margins recurved or revolute, rarely ½in. long, rigid at first, with pungent points, which at length wear off. Plant prostrate. 1820. (B. M. 2859.)

P. polifolia (Polium-leaved). *fl.* numerous, in dense, terminal heads, sessile within the last leaves; standard not twice as long as the calyx; lower petals shorter. May. *l.* linear, obtuse, ½in. to 1½in. long, with a fine, straight or recurved point, hoary beneath, and often hirsute with long hairs. *h.* 2ft. 1824. SYNS. *P. mucronata* (L. B. C. 1711), *P. rosmarinifolia* (B. R. 1584).

P. polygalifolia (Polygala-leaved). A synonym of *P. villosa.*

P. retusa (retuse). *fl.* few, in small, terminal heads, sessile within the last leaves; standard not twice as long as the calyx. April. *l.* linear or linear-cuneate, very obtuse or more frequently emarginate, rarely ½in. long, pale beneath. *h.* 1ft. 1789. (B. M. 2081; B. R. 378.)

P. rosea (rose-coloured).* *fl.* pink, produced in roundish heads, sessile within the last leaves; petals not twice as long as the calyx. April. *l.* linear-terete, obtuse or with short, callous points, channelled above by the involute margins. *h.* 2ft. 1877. (G. C. n. s., vii. p. 431.)

P. rosmarinifolia (Rosemary-leaved). A synonym of *P. polifolia.*

P. scabra (scabrous). *fl.* sessile in the upper axils, or three or four together at the ends of the branches; standard about twice as long as the calyx; keel deeply coloured. April. *l.* from obovate to narrow-cuneate, under ½in. long, truncate, emarginate, or shortly bilobed, and often mucronate, the margins revolute, scabrous above, tomentose or hairy beneath. *h.* 1½ft. 1803.

P. s. biloba (two-lobed). *l.* narrow-cuneate, dilated, and two-lobed at the end, with a short, recurved point; tomentum short. 1817. (B. M. 2091 and L. B. C. 550, under name of *P. biloba.*)

P. stipularis (stipuled). *fl.* numerous, in dense heads, sessile within the last leaves; calyx ciliate or hirsute; standard scarcely half as long again as the calyx. April. *l.* linear, acute, five-pointed, 1in. to 1½in. long, darker beneath; stipules narrow, often above ½in. long. *h.* 2ft. 1792. (B. M. 475.)

P. stricta (upright).* *fl.* nearly sessile, in small, dense heads, within the last leaves; standard nearly twice as long as the calyx. April to July. *l.* obovate, mucronate, quite glabrous above, often silky-pubescent beneath. *h.* 1ft. to 3ft. 1803. (B. M. 1588; L. B. C. 974.)

P. subumbellata (sub-umbellate). *fl.* golden-yellow, streaked with crimson behind, produced in fine, terminal, sub-umbellate heads, sessile within the last leaves. April. *l.* linear, obtuse, smooth on both sides. Branches cinereous, pilose. *h.* 1ft. 1831. (B. M. 3254; B. R. 1632.)

P. tenuifolia (slender-leaved). *fl.* solitary or two together, sessile on the smaller branchlets, and often shorter than the surrounding leaves. April. *l.* narrow-linear or terete, obtuse or scarcely acute, ⅛in. to ¼in. long, concave or channelled above by the involute margins. *h.* 1½ft. 1817. (B. M. 2085.)

P. villosa (villous).* *fl.* solitary in each axil, but sometimes forming short, terminal, leafy racemes; petals nearly twice as long as the calyx. April. *l.* linear-oblong, pilose beneath, as well as the branches and calyces, two or three lines long. *h.* 1ft. to 3ft. 1790. (B. M. 967.) SYN. *P. polygalifolia.*

PULVEREUS. Powdery.

PULVERULENTUS. Appearing as if dusted with powdery matter.

PULVINATE. Cushion-shaped.

PULVINUS. A cushion. The term is applied to an enlargement or a swelling at the base of a leaf, or at the apex of a petiole.

PUMILUS. Short; low; dwarf.

PUMPKIN. *See* **Cucurbita Pepo.**

PUNCTATE. Dotted.

PUNCTICULATE. Minutely punctate.

PUNGENT. Terminating gradually in a sharp, rigid point; *e.g.*, the lobes of a Holly leaf.

PUNICA (called by Pliny *Malum Punicum*, the Punic or Carthaginian Apple, probably with some allusion to *puniceus*, scarlet; referring to the colour of the flowers). Pomegranate. ORD. *Lythrarieæ.* A monotypic genus; the species is a very handsome, hardy, deciduous tree. The fruit of this genus is remarkable in being composed of two whorls of carpels, one placed above the other, the lower consisting of three or four, and the upper of from five to ten, carpels; the seeds have a pellucid, pulpy covering. For culture, *see* **Pomegranate.**

P. Granatum.* Common Pomegranate. *fl.* red, from two to five together, almost sessile, rising near the tops of the branches. June to September. *l.* lanceolate or oblong, entire, dotless. Stem arboreous. *h.* 15ft. to 30ft. Orient and North-western India (largely cultivated throughout the tropics), 1548. (B. M. Pl. 113; B. M. 1832.) Of this well-known and handsome tree, there are several forms, including the following:

FIG. 325. FLOWERING BRANCH OF PUNICA GRANATUM FLORE-PLENO.

P. G. flore-pleno (double-flowered). *fl.* white, having the calyx yellowish, double. Garden variety. See Fig. 325.

P. G. nana (dwarf). *fl.* much smaller than those of the type. *fr.* about the size of a Nutmeg. *l.* narrower, linear. Stem shrubby. *h.* 5ft. to 6ft. 1723. (B. M. 634.)

In addition to these, there are a number of garden forms, varying more or less in the colour of the flowers.

PUNICEUS. Bright carmine-red.

PUNNETS. *See* **Measures.**

PUPA. The third stage in the development of an insect. Let us take, as an example, the Large White Cabbage Butterfly (see Fig. 326). This butterfly is familiar to everyone in summer and autumn, flying in gardens, even in the heart of cities. The female lays eggs on the Cabbage leaves. From this first stage, after an interval, larvæ (the second stage) emerge, very worm-like in form, with a number of similar body-rings (see Fig. 327), and a distinct head, with strong jaws for cutting the food. Each of the three segments immediately behind the head bears a pair of true, though short, jointed legs, which correspond to the three pairs possessed by the greater number of perfect insects. The sixth to ninth segments, and the last one, each bear a pair of fleshy claspers, or "prolegs," by means of which, usually, the larvæ cling to any support, while the true legs are used for holding their food, as well as for walking. The claspers are not jointed, but belong to the

Pupa—*continued.*

skin in their origin, and are not present after the larval stage. When the larva is full-fed, it crawls away to search out a safe resting-place, and then spins round its middle a silken cord, which is fixed at both ends to the support. The tail, also, is fixed to the support by a pad of silk. The larva then sheds its skin, and the Pupa emerges, of the form shown in Fig. 327. This figure shows the wing-cases protecting the future wings, and also the sheath for the left antenna. All the limbs of the perfect insect are indicated on the outer shell of the Pupa, though bound down immovably, and all useless

FIG. 326. LARGE WHITE CABBAGE BUTTERFLY.

to the insect in this stage. Throughout this stage of development no food can be eaten. The Pupa is often called chrysalis (from the Greek work *chrysos*, golden), because of the metallic-yellow spots that appear in the Pupæ of certain common Butterflies, *e.g.*, the Tortoiseshell.

From the Pupa, usually after the winter has passed, the perfect insect emerges, bursting the skin on the front half of the back along the middle line, and crawling out. At first, the wings are only the size of the wing-sheaths of the Pupa, but, in an hour or so, they grow

FIG. 327. LARVA AND PUPA OF LARGE WHITE CABBAGE BUTTERFLY.

to their full size, and become stiff and firm, and fitted for flight (see Fig. 326). This example has been selected for description as one in which the Pupa differs much in appearance, powers of movement, and many other points, from the larva on the one side, and from the perfect insect on the other. But, in several large groups of insects, the difference is less marked; *e.g.*, the Pupa of a wasp has the limbs not bound down to the body, though it moves them little, and cannot eat any food. The Pupæ of beetles resemble those of wasps in this respect. Among certain orders of insects, the metamorphosis in incomplete, and the Pupa in these orders usually resembles the perfect insect in all points, except that the wings are represented only by rudimentary organs, quite useless for flight, and the larva differs from the Pupa only in its smaller size, and in the entire absence of any trace of wings. In these, the Pupa is as active, and feeds as voraciously, as the larva. As common insects that exemplify this condition of Pupa, may be mentioned Aphides, Crickets, and Grasshoppers. The helpless Pupæ, such as are met with among *Coleoptera*, *Diptera*, *Hymenoptera*, and *Lepidoptera* (*see* **Insects**) are usually protected in a cocoon, spun by the larva when it has reached a safe retreat, though a few resemble the Cabbage Butterflies in making no cocoon. Very often the retreat is underground, many of the larvæ burrowing, and making the cocoons in the soil, chiefly of grains of earth, cemented by a silken network, or by a fluid emitted from the mouth.

PUPALIA (*Pupali* is said to be the name in the East Indies). Including *Desmochæta*. ORD. *Amarantaceæ*. A genus comprising only three species of stove, slightly glabrous or tomentose, trichotomously-branched herbs or sub-shrubs, natives of tropical Asia and Africa. Flowers green, perfect ones solitary, the imperfect ones in fascicles, disposed in interrupted, simple or paniculate spikes; perianth of the perfect flowers five-parted, the segments lanceolate, acuminate, sub-equal; stamens five, the filaments very shortly connate at base. Leaves opposite, petiolate, ovate or orbicular, obtuse or acuminate, entire. *P. atropurpurea* is probably the only species in cultivation. It is an evergreen sub-shrub, thriving in sandy loam. It may be increased by means of cuttings, inserted in sand, under a bell glass, in heat.

P. atropurpurea (dark purple). *fl.* dark purple, disposed in spikes, 3in. to 7in. long. September. *l.* 2½in. to 3in. long, fully 1in. broad, slender, long-stalked, ovate, acuminate, obsoletely mucronulate, slightly dotted. Stem striated. Branches purplish, ascendent. *h.* 1½ft. to 2ft. Tropics, 1759.

PURGATIVE. A cathartic; any plant which is used in medicine as an evacuant.

PURIFICATION FLOWER. A common name of *Galanthus nivalis*.

PURPLE CARROT-SEED MOTH (*Depressaria depressella*). This insect is, along with congeners already mentioned (*see* **Carrot-blossom Moth** and **Flat-body Moth**), at times, hurtful to Carrots and Parsnips grown for seed, inasmuch as the larvæ feed, in company, on the flowers, protected under a slight web, spun over the umbels. When full-fed, they burrow into the stalks, and there become pupæ. The moths emerge early. The spread of wings is a little over ½in. The front wings are reddish-brown, with a bent, pale yellowish band near the hind margin, and a large, pale spot on the inner margin, beyond the middle. The head is pale yellow. The larva is green, with a tinge of red, but has the head and second segment black.

Remedies. The most efficient is hand-picking the infested umbels, and destroying the larvæ. The damage done is seldom very serious.

PURPLE MEDICK. *See* **Medicago sativa.**

PURPLE WREATH. *See* **Petræa volubilis.**

PURPURASCENS. Purplish.

PURSHIA (named after Frederick Pursh, author of "Flora Americæ Septentrionalis," 1817). SYNS. *Kunzia*, *Tigarea*. ORD. *Rosaceæ*. A monotypic genus, the species being a much-branched, hardy, evergreen shrub, with scaly buds. It thrives in a sandy soil. Propagated by cuttings of young shoots, inserted in sand, under a hand light, in early summer.

P. tridentata (three-toothed). *fl.* yellow, terminal, on short peduncles. July. *l.* obcuneate, tridentate, crowded on the points of the shoots, hairy above, tomentose beneath. *h.* 2ft. to 3ft. North-west America, 1826. (B. R. 1446; H. F. B. A. 58.)

PURSHIA (of Sprengel). A synonym of **Onosmodium** (which *see*).

PURSLANE. *See* **Portulaca oleracea.** The name is also used for several species of *Claytonia*, &c.

PURSLANE-TREE. *See* **Portulacaria afra.**

PUSCHKINIA (named in honour of M. Pouschkin, a Russian botanist). SYN. *Adamsia*. ORD. *Liliaceæ*. A genus comprising only a couple of species of hardy or half-hardy, bulbous plants, natives of Asia Minor, the Caucasus, and Afghanistan. Flowers few, loosely racemose, sometimes solitary on the simple, leafless scape; perianth with a short, campanulate tube, and six longer, sub-equal, somewhat spreading segments. Leaves radical, few, the first usually oblong, the rest linear. Only one of the species is in cultivation. This thrives very well in the rock garden and borders, in a compost of sandy loam and leaf mould. Propagated by dividing the bulbs, which should be done every two or three years.

P. libanotica (Mount Lebanon). A synonym of *P. scilloides*.

FIG. 328. PUSCHKINIA SCILLOIDES, showing Habit, detached Flower, and Upper Portion of Leaf.

P. scilloides (Scilla-like).* Striped Squill. *fl.* white, richly striped with pale blue down the centre, and on both sides of the reflexed perianth segments; perianth ½in. to nearly 1in. across; pedicels slender, distant; spikes secund, on slender, bending scapes. Spring. *l.* few, 4in. to 6in. long, lanceolate, concave, dark green. *h.* 4in. to 8in. Orient, 1819. A very handsome little spring-flowering plant. See Fig. 328. (B. M. 2244; Gn., Sept., 1878.) SYNS. *P. libanotica*, *P. sicula* (F. d. S. 2220), *Adamsia scilloides* (R. G. 310). A more compact-flowering form is in cultivation, under the name of *compacta*; its flowers are also more numerous.

P. sicula (Sicilian). A synonym of *P. scilloides*.

PUSILLUS. Very small; weak and slender.

PUSS MOTH (*Dicranura vinula*). This moth is of interest to gardeners, because the larvæ feed on leaves of Willows and of Poplars, and, at times, do damage to those trees. The moths reach 2½in. or 3in. in spread of wing, and have large, heavy bodies. Body and wings are grey, with many darker markings. Those on the front wings are as follows: Near the base of the wing are five or six black spots; then follows a broad, grey cross-band; the middle of the wings is less marked, but the hinder part bears about nine long, dark streaks running inwards, and a number of V-shaped, dark lines, with the tip pointed inwards. The antennæ are feathered in both sexes. The larvæ are very curious in form; the head is flat, and is drawn back into the second segment, on which the body rises to a sharp hump, then it sinks to the sixth, then is of uniform breadth to the ninth, and behind this it tapers rapidly to the last segment, which ends in two long, slender, curved horns, from each of

Puss Moth—*continued.*

which a pink filament can be pushed out by the larva when irritated. This latter is used for driving away ichneumons and other parasites. The horns are believed to be the last pair of prolegs modified. There are four pairs of prolegs used for grasping, and the larvæ generally hold on by them, keeping the ends of the body raised from the twig or leaf to which they cling. In colour, they are remarkable, though by no means conspicuous while on the trees. There is a white line along each side, from the back of the head to the tip of the hump, thence passing obliquely to the middle of each side of the eighth segment, and then again rising to the bases of the horns. Between the white lines the back is white, streaked with purple-brown. This latter colour is deepest near the lines. Below them the body is green, with a purple mark above the proleg on each side of the eighth segment. The head is brown, with black sides, and when drawn back is surrounded with a pink rim, with two black spots. When full-fed, the larvæ gnaw holes in the bark, in which they form very tough, strong cocoons, of chips and a gluey secretion emitted by themselves, and in these cocoons they become brown pupæ in autumn. The moths emerge in June. There are two or three smaller species of the same genus, which are much like the Puss Moth in appearance and in habits, and, because of this and of their smaller size, are called Kittens. Of these, the Poplar Kitten (*D. bifida*) feeds on Aspen and other Poplars, the Sallow Kitten (*D. furcula*) on Willows, and the Alder Kitten (*D. bicuspis*) on Alder. They are seldom so hurtful as to attract observation.

Remedies. If at any time any of the above are sufficiently numerous to be hurtful, the only efficient remedy is hand-picking the larvæ, or beating them from the branches. The cocoons should be sought for, and the pupæ destroyed; and the moths should be killed when seen.

PUSTULAR, PUSTULATE. Covered with glandular excrescences like blisters.

PUTAMEN. The endocarp of a stone fruit.

PUTORIA (from *putor*, a strong smell; in allusion to the smell of the leaves). ORD. *Rubiaceæ*. A small genus (two or three species) of dwarf, half-hardy, branched shrubs, inhabiting the Mediterranean region. Flowers white or purple, fascicled at the tips of the branches, about 1in. long; calyx with an elongated-ovoid tube and an obtusely four-toothed limb; corolla infundibular-tubulose, with an elongated tube and a limb of four, rather short, spreading, valvate lobes; pedicels bracteolate. Leaves opposite, shortly petioled, linear-oblong, a trifle fleshy. *P. calabrica*—the only species in cultivation—is a pretty plant. It thrives in a gravelly soil, and is propagated by division.

P. calabrica (Calabrian). *fl.* red, in terminal, few-flowered corymbs. July. *l.* oblong, obtuse, rather smooth, pale beneath, scabrous on the edges and keel; stipules solitary on both sides. Stem much branched; branches clothed with velvety down. *h.* 6in. 1820. SYNS. *Asperula calabrica*, *Ernodea montana* (S. F. G. 143).

PUTTERLICKIA (named after A. Putterlick, 1810-1845, assistant at the Botanical Museum of Vienna). ORD. *Celastrineæ*. A genus comprising only a couple of species of greenhouse, very glabrous, spiny, South African shrubs. Flowers green, with a purple disk; calyx segments, petals, and stamens, four or five, the petals and stamens spreading; cymes axillary, paniculate; pedicels elongated, divaricate. Leaves alternate or fascicled, stalked, obovate, entire or spinuloso-serrate, exstipulate. Branchlets angular or terete. For culture of the under-mentioned species, *see* **Celastrus.**

P. Pyracantha (Pyracantha-leaved). *fl.*, petals oblong; calyx minute, obtuse. Winter. *l.* tufted, rarely solitary, oval or obovate-cuneate, netted veined. *h.* 2ft. or more (B. M. 1167, under name of *Celastrus Pyracanthus*.)

PUYA (the native name of the plant in Chili). SYN. *Pourretia.* ORD. *Bromeliaceæ.* A genus (eight or ten species) of stove or greenhouse, perennial herbs, natives of Chili and Peru. Flowers showy, blue, yellow, or white, solitary, disposed in a simple or pyramidal-branched, terminal raceme; sepals free, oblong or lanceolate, loosely imbricated; petals free, connivent in a tube at the base, spreading above, rather broad. Leaves either at the base or tip of the stem, clustered, spiny-serrate. The two species here described — probably the only ones in cultivation — thrive in a compost of loam and peat. Propagation is easily effected by suckers, or by seeds when procurable.

P. Altensteinii (Altenstein's). A synonym of *Pitcairnia Altensteinii.*

P. cærulea (blue). A synonym of *P. Whytei.*

P. gigas (giant). *fl.* white or rose-coloured, disposed in erect spikes, from 18ft. to 30ft. in height. *l.* tufted, linear-lanceolate, hoary, spiny-toothed, mealy-white beneath. New Grenada, 1881. An extraordinary species. (R. H. 1881, 74; Gn., May 6, 1882.) It is very uncertain to what genus this plant really belongs, as the flowers have not been seen by any specialist. It has the foliage of an Agave.

P. grandiflora (large-flowered). A synonym of *Pitcairnia ferruginea.*

P. heterophylla (variable-leaved). A synonym of *Pitcairnia heterophylla.*

P. longifolia (long-leaved). A synonym of *Pitcairnia heterophylla.*

P. maidifolia (Indian Corn-leaved). A synonym of *Pitcairnia maidifolia.*

P. sulphurea (sulphur-coloured). A synonym of *Pitcairnia Wendlandi.*

P. virescens (greenish). A synonym of *Pitcairnia virescens.*

P. Warcewiczii (Warcewicz's). A synonym of *Pitcairnia atrorubens.*

P. Whytei (Whyte's). *fl.* of a peculiar metallic greenish-blue colour, with bright orange anthers, disposed in a large, pyramidal panicle, on a tall scape. Autumn. *l.* tufted, crowded, recurved, elongately subulate, remotely spinescent. *h.* 3ft. Chili, 1867. A handsome plant, quite hardy in the South of England. (B. M. 5732.) SYN. *P. cærulea.*

PYCNIDIA. Small bodies, very like perithecia (*see* **Perithecium**) in general appearance and form, only they are usually smaller, paler, and thinner walled; and the spores in them, instead of being inclosed in asci, are situated, singly or in chains, on the tips of small branches of mycelium that arise from the inner surface

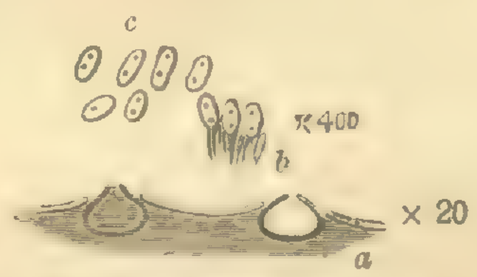

FIG. 329. PHOMA HERBARUM (Pycnidial Stage of *Pleospora herbarum*)—*a*, Pycnidia in transverse section, × 20, one opened; *b*, Conidia still on the Stalks, × 400; *c*, Conidia free after falling off the Stalks, × 400.

of the wall of the Pycnidium (see Fig. 329). The spores are called stylospores, because of being produced at the tips of these slender, rod-like branches, like a *stylus*, or pen. A reference to **Pleospora,** of which *Phoma* is a Pycnidial form, will help to render clearer the relation of this form of fruit to the perithecia.

PYCNODORIA. Included under **Pteris** (which *see*).

PYCNOPTERIS. Included under *Nephrodium.*

PYCNOSTACHYS (from *pyknos*, dense, and *stachys*, a spike; referring to the dense flower-spikes). SYN. *Echinostachys.* ORD. *Labiatæ.* A small genus (six species) of erect-growing, stove, annual or perennial herbs, natives of tropical or sub-tropical Africa and Madagascar. Flowers in whorls, which are disposed in dense, terminal spikes; corolla blue, with an exserted, defracted tube, two-lipped, the upper lip four-toothed, the lower entire and concave; calyx ovoid-campanulate, equal, with five

Pycnostachys—*continued.*

subulate-spinose teeth. Nutlets almost round, smooth. Leaves stalked, linear-lanceolate to broadly ovate, coarsely toothed. Only two species have been introduced to our gardens. For culture, *see* **Ocimum.**

P. cærulea (blue). *fl.*, corolla blue; calyx sessile; spike from 1in. to 2in. long. August. *l.* sessile, oblong or linear-lanceolate, 2in. to 3in. long, acute, slender, deeply serrated, entire, and narrowed at base, glandulose beneath. Stem over 1ft. high, tetragonal. Madagascar, 1825. Annual. (H. E. F. 202.)

P. urticifolia (Nettle-leaved). *fl.* blue; upper lip of corolla erect, with four incurved lobes; lower one concave; spike terminal, ovate, acuminate, large, thyrse-like. August. *l.* ovate, acuminate, truncate or very obtuse at base, sub-cuneate, long-stalked, deeply serrated, pubescent beneath. *h.* 3ft. Africa, 1862. Perennial. (B. M. 5365.)

PYGÆRA BUCEPHALA. *See* **Buff-tip Moth.**

PYGMÆUS. Pigmy; dwarf.

PYKNOS. This term, used in Greek compounds, signifies thick, close, dense, compact; *e.g.*, *Pycnocephalus*, thick-headed.

PYRACANTHA. *See* **Cratægus Pyracantha.**

PYRALIS (*Hypena*) **ROSTRALIS** (Hop Snout Moth). This insect is common in the southern districts of England, where the larvæ feed on the leaves of the Hop, frequently doing a great deal of harm to them. The moths, when at rest, have the wings folded horizontally, and assume the form of the Greek letter *delta* (Δ). They have long palpi, projecting forwards, and the group may be recognised by this peculiarity, whence they are called Snout Moths. The front wings are greyish-brown, darker towards the base, paler along the front margin and across the terminal half of the wing, and a dark line runs from the tip, diverging from the rear margin. The hind wings are uniform brownish. The spread of wings is a little over 1in. The larvæ are rather slender, tapering in front, pale green, with narrow, white lines lengthwise; they have six true legs and eight prolegs or claspers. When full-fed, they spin slight cocoons in leaves drawn a little together, and there become pupæ.

Remedies. Hand-picking the larvæ, and the leaves inclosing pupæ, and burning all surface rubbish with the pupæ in it, is the most effectual remedy. Beating the Hops (taking care not to injure the plants) and jarring the Hop-stakes, so as to cause the larvæ to fall on to sheets, is efficacious; the larvæ being afterwards burnt. Syringing the plants with any of the usual insecticides, by means of a garden engine, is also of use.

PYRAMIDAL. Pyramid-shaped; more frequently used, however, to denote conical; *e.g.*, a Carrot.

PYRENA. The stone caused by the hardening of the endocarp in drupaceous fruits.

PYRENOMYCETES (from *pyren*, a kernel or stone of fruit, and *mykes*, a Fungus). A very large group of Fungi, so named because they produce, in the processes of reproduction, small, hard, dark bodies (perithecia and pycnidia), in which certain forms of spores are protected. The *Pyrenomycetes* form one of three families, into which a very large order of Fungi, called *Ascomycetes*, is divided. This order is characterised by the mode of origin of a form of spore, regarded as the most highly developed of the various kinds produced in them. These spores are produced from a portion of the protoplasm, or living substance, contained in certain long, cylindrical, thin-walled cells, called asci. In each ascus (see Fig. 330) there are usually eight spores formed, but the number varies, in different Fungi, from two to an indefinite number in each, though constant in each species. In most Ascomycetous Fungi, the asci grow crowded together, either alone or intermixed with slender filaments (paraphyses) (see Fig. 330); and,

Pyrenomycetes—*continued.*

in most, these groups of asci are surrounded with an outer coating of hyphæ, united so as to simulate true parenchyma. In one group—the *Discomycetes*—this protecting tissue merely forms a saucer or disk, or a club, on which the asci stand (*e.g.*, in *Peziza*), and the surface bearing the asci is exposed. In a few, *e.g.*, *Exoascus Pruni* (*see* remarks on FUNGI, under **Plum**), the asci stand isolated and exposed, and not on any special area of the surface. In the *Pyrenomycetes*, including among them the *Perisporacei*, the protecting tissue forms a continuous sphere or flask-shaped perithecium, which entirely incloses the asci with the spores in them, and which, as in the *Perisporiaceæ*, may be entirely closed, but far more generally opens by a pore or slit on its upper surface, or at the end of a more or less elongated neck. As a rule, there are many asci in each perithecium; but in a few species they may be few, or even reduced to a single ascus, as in *Podosphæra* (*see* PLUM FUNGI). Both in *Discomycetes* and in simple *Pyrenomycetes*, the development of the asci and spores has been traced to a union of male and female organs, and the protecting layers have been traced to branches developed from the mycelium after the female cell is fertilised.

FIG. 330. TWO ASCI OF PEZIZA POSTUMA, each with eight Spores (magnified about 250 times).

The *Pyrenomycetes* live on every kind of food—on dead wood and leaves, on dead animal matter, on excrements, on the soil, and on living plants and animals; in this latter case, they are true parasites. Some of them prove hurtful to cultivated plants. An account of the more important structural characters of the *Erisypheæ*, and of the injuries they inflict, will be found under the headings **Mildew** and **Oidium**. The restricted, or true, *Pyrenomycetes* differ from the *Perisporiaceæ* (of which the *Erisypheæ* form the section of most importance to gardeners) in the perithecium opening by a pore or a slit, and in the mycelium being not superficial, but sunk among the food, whether that is dead, or a living plant or animal. Hence, the mycelium is entirely concealed; and the parts which attract our notice are, in most cases, only the reproductive organs. There are several kinds of spores produced, as has been mentioned under **Pleospora**. The ascospores, or those contained in the asci, may be round, elliptical, or thread-like, transparent or brown, undivided, or divided by one, two, three, or many septa. In this latter case, the spores often seem very complex in their structure, being built up of many cells. The perithecia vary considerably in texture, whether nearly membranous, carbonaceous, or fleshy (*Nectriaceæ*), and in form of orifice, whether a simple slit (in *Hysteriacei*), or a pore (*Pleospora*), or with thickened lips (*Lophiostomacei*). In some, the perithecia are scattered (*Pleospora*); in others, they are crowded together on specially modified parts of the Fungus (in *Xylaria*, *Claviceps*, &c.), or are sunk in the mycelium, in a mass called a "stroma." Besides the perithecia with ascospores, other structures, called *pycnidia*, much like perithecia in external appearance, are developed; and in them are contained spores, often much like those contained in the asci, *e.g.*, in *Cucurbitaria Laburni*, where both are multicellular and brown, but, perhaps, more often very different from them in appearance, *e.g.*, in *Pleospora herbarum*, in which the ascospores are multicellular and brown, and the pycnidiospores are unicellular, transparent, and very much smaller (see **Pleospora**). The pycnidia have been named *Phoma herbarum*. Pycnidia are, in most cases, smaller and thinner-walled than the perithecia; but they vary in these respects, and also in being solitary in some groups, and crowded together in others. Occasionally, they are sunk in a stroma. They usually occur on the mycelium before the perithecia are formed, but may be associated with the latter. In the pycnidia, the spores are produced on the tips of branches, not in asci; but pycnidiospores are occasionally found in the same receptacle with ascospores.

Other modes of spore formation occur in many species (*see* **Pleospora**), resulting in the formation of conidia on the tips of branches that rise from the mycelium creeping on the surface of the body in which the Fungus is growing. These conidiophores, or conidia-bearers, are very various in form and modes of branching, and in the structure and form of their spores. In some cases, they are so associated with the more perfect stages of the Fungi that there is little difficulty in recognising their relationships; *e.g.*, the very common *Tubercularia vulgaris* on dead branches is always followed by *Nectria cinnabarina* in such a manner as to indicate clearly their being states of the same Fungus. But the greater number of conidiophorous Fungi have not yet been referred as earlier stages to higher forms, though careful observations will almost certainly result in their being so, and will free the study of microscopic Fungi from a vast amount of doubt, and from multitudes of so-called species. In the meantime, in the imperfect state of our knowledge of these plants, it is found expedient to retain them in the group called *Hyphomycetes*, even though they are thus associated with *Peronospora*, and with other forms not closely related to them. Still another mode of reproduction in some is by means of *Sclerotia*, or hard masses of mycelium (*see* **Sclerotia**). It has been necessary to enter thus fully upon the account of the modes of reproduction observed in the *Pyrenomycetes*, since it is these alone that afford material for distinguishing the various genera and species, the mycelium not yielding characters that can be relied on for genera, or even families, much less for species. For an account of the injuries inflicted on cultivated plants by the *Erisypheæ* among *Perisporiacei*, *see* **Mildew** and **Oidium**. Among the restricted *Pyrenomycetes*, a good many species are parasitic upon living plants; and several of these are injurious to field or to garden produce. Some of them are hurtful in the early stages of their growth, the perithecia being formed only after the death of the tissues on which they feed. Others only weaken the host-plants, and are to be found in all their stages upon living tissues of these plants. Some have already been referred to under the headings **Pleospora** and **Plum** (FUNGI). Among the most injurious forms may be mentioned one very hurtful to grasses that are grown for seed, viz., the Ergot (*Claviceps purpurea*), which, however, does so little harm to gardeners as to require no special notice here.

PYRETHRUM (*Pyrethron*, the old Greek name used by Dioscorides, probably from *pyr*, fire; referring to the acrid roots of this genus). Feverfew. ORD. *Compositæ*. A genus of mostly hardy, herbaceous perennials, now included, by Bentham and Hooker, under *Chrysanthemum*. "The distinctive features reside in the presence in *Pyrethrum* of a pappus, in the form of an elevated membranous

Pyrethrum—*continued.*

border, and in the achenes being angular but not winged" (Lindley and Moore). All the species here described are hardy, herbaceous perennials. For culture, &c., *see* **Chrysanthemum.**

FIG. 331. FLOWER-HEADS OF PYRETHRUM FRUTESCENS.

P. achilleæfolium (Achillea-leaved).* *fl.-heads* golden-yellow, almost globular, few, on long stalks, and disposed in loose corymbs; inner scales of the involucre round, white, and transparent at the top. Summer. *l.* pinnatifid, with pinnate segments, covered with silky down when young, and pubescent when full grown. *h.* 2ft. Caucasus, 1823. A variety known as *pubescens* has numerous heads arranged in broad corymbs.

P. corymbosum (corymbose).* *fl.-heads* white; peduncles corymbose; involucral scales ovate-lanceolate, with fuscous, scarious margins. July. *l.* pinnatisect; segments lanceolate, pinnatifid,

FIG. 332. UPPER PORTIONS OF PLANT OF PYRETHRUM ROSEUM.

Pyrethrum—*continued.*

the lobes acute and argutely serrated. Stem erect, angular, branched at apex. *h.* 1ft. Europe, &c., 1596. (J. F. A. 379, under name of *Chrysanthemum corymbosum.*)

P. frutescens (shrubby). *fl.-heads* with white ray florets. *h.* 3ft. Canary Islands, 1699. From this species a great number of varieties have sprung. See Fig. 331. *See also* **Chrysanthemum frutescens.**

P. lacustre (lake-loving). *fl.-heads* pure white, with a yellow centre, about 2in. across, solitary, terminal and axillary. Late summer. *l.* alternate, numerous, sessile, ovate-lanceolate, coarsely and irregularly toothed. *h.* 2ft. to 2½ft. Portugal.

P. parthenifolium aureum (golden Parthenium-leaved).* Golden Feather. A free-growing and well-known, hardy plant, extensively used for carpet beds and edgings. Seeds should be sown, in a gentle heat, during March. The seedlings grow very rapidly, and will be ready for planting out in May or early in June. The flower-buds must be picked off whenever they appear.

P. Parthenium (Parthenium). Common Pellitory or Feverfew. *fl.-heads* with a yellow disk and white ray, disposed in a corymbose panicle. June. *l.* stalked, compound, flat; leaflets ovate, pinnatifid and toothed. Stem erect. *h.* 2ft. Europe (Britain). The whole plant has a strong and bitter smell. (F. D. 674, under name of *Matricaria Parthenium*; Sy. En. B. 715, under name of *Chrysanthemum Parthenium*). The double-flowered form is largely grown, and is very handsome.

FIG. 333. PYRETHRUM ROSEUM FLORE-PLENO.

P. roseum (rosy).* *fl.-heads* larger than those of *Chrysanthemum leucanthemum*, solitary; ray florets rose-coloured; disk yellow. *l.* pinnatifid, with decurrent, lanceolate segments of a vivid green colour. *h.* 1ft. to 2ft. Orient. This species, with one or two others, is important from an economic point of view, as it is largely used in the manufacture of "insect powders." See Fig. 332. (B. R. 1084; B. M. 1080, under name of *Chrysanthemum coccineum.*) A large number of varieties, varying much in size and colour of flower-heads, are now grown; there is, too, a large series of double forms, one of which is represented in Fig. 333.

P. Tchihatchewii (Tchihatcheff's).* *fl.-heads* with a yellowish disk and a pure white ray, small, solitary, on axillary stalks 3in. to 6in. long. Early summer. *l.* bipinnatifid, glabrous, dark green, toothed at the base of the petiole. Stems very numerous, rooting. *h.* 2ft. Asia Minor, 1869. A handsome species, forming a dense tuft. It thrives remarkably well on slopes, dry banks, and under trees where grass will not grow. The seeds, by which it is mostly increased, should be sown in pots or pans, and the seedlings, when large enough, transplanted to their permanent quarters at about 3in. apart.

P. uliginosum (moisture-loving).* Great Oxeye. *fl.-heads* with a yellow disk and a white ray, over 2in. across, on slender and gracefully-bending stalks. August. *l.* smooth, lanceolate, sharply toothed, about 4in. long, sessile. Stems stout. *h.* 5ft. Eastern Europe, 1816. A very bold and strong-growing species, having a handsome and distinct appearance when covered with a profusion of its blossoms. It is perfectly hardy, and prefers a rather sheltered situation. (B. M. 2706.)

PYRGUS. A synonym of *Ardisia.*

PYRIFORM. The same as **Pear-shaped** (which *see*).

PYROLA (a diminutive of *Pyrus*, the Pear-tree; so-called from some fancied resemblance in the foliage, which is not obvious). Wintergreen. ORD. *Ericaceæ.* A genus comprising about fourteen species of hardy,

Pyrola—*continued.*

perennial, very glabrous, stolon-bearing, stemless or caulescent herbs (one species leafless), natives of Europe, (Britain), North and Central Asia, and North America, including Mexico. Flowers white, yellow, pink, or pale purple, on erect, bracteate, racemose scapes, nodding; calyx five-parted, persistent; petals five, concave, sessile, more or less incurved-connivent; stamens ten. Leaves radical or cauline, alternate, usually long-stalked, persistent, entire or serrated. Several species are very pretty, and well worth growing. They thrive in thin, mossy copses, on light, sandy, vegetable soil, or in moist and half-shady parts of the rockwork or fernery. Propagated by division.

P. elliptica (elliptic). *fl.* white, campanulate, with a grateful smell; racemes elongated, few-flowered, rather secund. June and July. *l.* cuneate-oblong, coriaceous, acute at base, twice as long as the narrow petioles, the margins remotely toothed or quite entire. *h.* 6in. North America, 1818. (H. F. B. A. 134.)

P. maculata (spotted). A synonym of *Chimaphila maculata.*

P. media (intermediate). *fl.* white, tinged with red, ½in. in diameter; racemes many-flowered; pedicels scattered. July and August. *l.* orbicular-ovate, crenate, sometimes 1¾in. in diameter. *h.* 4in. Europe (Britain). (Sy. En. B. 897.)

P. minor (smaller). *fl.* white, tinged with red, drooping, globose, ¼in. in diameter; raceme short; scape 8in. to 12in. long, slender. June to August. *l.* orbicular-ovate, obscurely crenate, usually arranged in a rosette, but sometimes alternate, coriaceous, 1in. to 1½in. long, contracted into the longer petiole. Europe (Britain), North America. (F. D. 55; Sy. En. B. 898.)

P. rotundifolia (round-leaved).* *fl.* pure white, fragrant, from ten to twenty in a drooping raceme on an erect stem 6in. to 12in. high. Summer. *l.* roundish, quite entire or crenulated, shorter than the dilated petioles. *h.* 6in. Europe (Britain). (F. D. 1816; Sy. En. B. 895.) The variety *arenaria* (Sy. En. B. 896), found on sandy sea-shores, differs from the type in having smaller leaves, and pedicels as long as the ovate sepals, and, generally, several scale-like bracts below the inflorescence. Both the type and its variety are exceedingly pretty plants for rockwork, and prefer a sandy soil.

P. secunda (side-flowering).* *fl.* greenish-white, horizontal, ¼in. in diameter; racemes secund, 1in. to 2in. long; scape slender, 2in. to 5in. long. July. *l.* ovate, acute, serrate, 1in. to 1½in. long, rosulate or alternate, rather thin, reticulate; petioles shorter. Stem straggling; branches 1in. to 4in. long, ascending. Europe (Britain), West Asia, North America. (F. D. 402; Sy. En. B. 899.)

P. umbellata (umbelled). A synonym of *Chimaphila corymbosa.*

P. uniflora (one-flowered). A synonym of *Moneses uniflora.*

PYROLIRION. Included under **Zephyranthes** (which *see*).

PYROSTEGIA IGNEA. A synonym of *Bignonia venusta.*

PYRRHEIMA. Included under **Tradescantia** (which *see*).

PYRULARIA (a diminutive from *Pyrus*, the Pear; in allusion to the form of the fruit, which, in the original species, is like a small Pear). SYNS. *Hamiltonia*, *Sphærocarya.* ORD. *Santalaceæ.* A genus comprising only a couple of species of deciduous trees or shrubs, one North American, the other Himalayan. Flowers cymulose at the tips of the branches, or in the upper axils; cymelets forming a terminal, compound raceme, or a raceme-like panicle; fertile flowers usually few at the tips of the branches, often twin or solitary. Drupe ovoid or sub-globose, rather large. Leaves alternate, shortly pedicellate, membranous. The only species in cultivation is a half-hardy shrub; it thrives in sandy loam, and may be increased by cuttings.

P. oleifera (oil-bearing). Buffalo, Elk, or Oil Nut. *fl.* greenish; spike small, few-flowered, terminal. May. *fr.* 1in. long. *l.* obovate-oblong, acute, or pointed at both ends, soft, very veiny minutely pellucid-dotted. *h.* 3ft. to 12ft. North America, 1800. Plant minutely downy when young, at length glabrous, imbued with an acrid oil, especially the fruit. SYN. *P. pubera.*

P. pubera (downy). A synonym of *P. oleifera.*

PYRUS (the old Latin name used by Pliny for the Pear-tree). Apple, Pear, Service, &c. Including *Malus* and *Sorbus.* *Cydonia* and *Mespilus* are also included, by Bentham and Hooker, under this genus; but, for horticultural purposes, they are kept distinct in this work. Some of the plants met with in gardens under the generic name of *Aronia* belong here. ORD. *Rosaceæ.* A genus comprising from thirty-five to forty species of hardy trees or shrubs, inhabiting the temperate regions of the Northern hemisphere, and the mountains of the East Indies. Flowers in terminal cymes, rarely corymbose, or reduced to one or two flowers; bracts subulate, deciduous; calyx tube urceolate or rarely turbinate; petals five, sub-orbiculate, shortly unguiculate. Fruit fleshy, ovoid, globose, or pyriform. Leaves alternate, deciduous, petiolate, simple or pinnate, often serrate; stipules deciduous. The species are readily raised from seeds, in the way mentioned under **Apple** and **Pear**; the garden varieties and weaker-growing, ornamental species are most readily propagated by grafting or budding on the Apple or Pear stocks. Except where otherwise stated, the flowers in the under-mentioned species are white.

P. acerba (sour). A synonym of *P. Malus acerba.*

P. americana (American). American Mountain Ash. *fl.* in large, flat cymes. June. *fr.* bright red, globose, not larger than peas, disposed in clusters. *l.* odd-pinnate; leaflets thirteen to fifteen, lanceolate, taper-pointed, sharply serrate, with pointed teeth, rather shining above, and scarcely pale beneath. Northern United States, &c., 1782. Tree or tall shrub. (W. D. B. i. 54.) SYN. *Sorbus americana.*

P. a. microcarpa (small-fruited). This variety is only distinguished from the type by its smaller fruits.

P. angustifolia (narrow-leaved). *fl.* rose-colour, with distinct styles. April. *l.* simple, oblong or lanceolate, often acute at the base, mostly toothed, glabrous. *h.* 20ft. North America, 1750. Tree. "Perhaps a variety of *P. coronaria*" (Asa Gray). (B. R. 1207; W. D. B. 132.)

P. arbutifolia (Arbutus-leaved).* Choke-berry. *fl.* white or tinged with purple; cymes woolly. May and June. *fr.* red or purple, pear-shaped, or, when ripe, globular. *l.* simple, oblong or obovate, finely serrate woolly beneath. *h.* 2ft. to 10ft. North America, 1700. Shrub. (B. M. 3668.) SYN. *P. floribunda* (B. R. 1006).

P. a. melanocarpa (black-fruited). This only differs from the type in its somewhat larger leaves and dark purple fruit. SYN. *P. grandifolia* (B. R. 1154).

P. Aria.* Aria; White Beam-tree. *fl.* ½in. in diameter, in loose corymbs. May and June. *fr.* dotted with red, ½in. in diameter, sub-globose. *l.* simple or pinnatifid, rarely pinnate at base, 2in. to 6in. long, very variable, glabrous above, plaited, coarsely and irregularly serrate, deeply lobed, white and flocculent beneath. *h.* 4ft. to 40ft. Europe (Britain), &c. Bush or small tree. (Sy. En. B. 482.) The following are defined by Mr. Boswell as sub-species:

P. A. latifolia (broad-leaved). *l.* from ovate-oblong to sub-orbicular, more or less lobed, grey-tomentose beneath; lobes deltoid, serrate-acuminate, the nerves five to nine on each side, less prominent beneath. This approaches *P. torminalis.*

P. A. rupicola (rock-loving). *fr.* inclining to carmine, ¾in. in diameter. *l.* obovate-oblong, lobed above, snow-white beneath; nerves five to eight on each side.

P. A. scandica (Scandinavian). *l.* less coriaceous than in the type, oblong, deeply lobed or pinnatifid, glabrous above, clothed with a loose grey tomentum beneath; lobes oblong or rounded. Arctic Europe.

P. Aucuparia (fowler's).* Mountain Ash; Rowan-tree. *fl.* cream-white, ½in. in diameter; pedicels and calyces villous; cymes 4in. to 6in. in diameter, compound, corymbose, dense-flowered. May and June. *fr.* scarlet, with yellow flesh, globose, ⅓in. in diameter. *l.* 5in. to 8in. long, pinnate; leaflets six to eight pairs, 1in. to 1½in. long, linear-oblong, sub-acute, serrate, pale beneath, and hairy along the midrib and nerves, glabrous beneath when old, or nearly so. *h.* 10ft. to 30ft. Europe (Britain), Siberia, &c. Tree. (Sy. En. B. 486.) Of this species there are many varieties, the principal of which are: *fastigiata*, a form of strict, erect, habit; *fructu-luteo*, with yellow fruit; *pendula*, with weeping branches; and *variegata*, with variegated leaves.

P. baccata (berried).* *fl.*, calyx lobes deciduous; peduncles crowded. April and May. *fr.* yellow, tinged with red, roundish, about the size of a cherry. *l.* ovate, acute, equally serrated, glabrous, the length of the petioles. *h.* 15ft. to 20ft. Siberia and Dahuria, 1784. Tree. The pulp of the fruit is used, in Siberia, for making quasar punch. (B. M. 6112.)

P. betulæfolia (Birch-leaved). *fl.* disposed in sessile umbels, appearing before the leaves; anthers deep red. *fr.* brownish, dotted with white, small, sub-globose. *l.* whitish, on long petioles, elliptic, acute at both ends, serrate, 2in. long, 1in. broad. China, 1879. Shrub. See Fig. 334. (R. H. 1879, 318.)

Pyrus—*continued.*

P. Bollwylleriana (Bollwyllerian). *fl.* disposed in many-flowered corymbs. April. *fr.* orange-yellow, small, turbinate. *l.* simple, ovate, coarsely serrated, tomentose beneath and on the buds, when young velvety above, but glabrous in the adult state. *h.* 20ft. ⁵ Rhineland, 1786. Tree. (B. R. 1437.) SYN. *P. Pollveria* (L. B. C. 1009).

P. Botryapium (Botryapium). A synonym of *Amelanchier canadensis.*

Pyrus—*continued.*

lanceolate, acute, entire, covered with a whitish, silky pubescence. Asia Minor, &c. An ornamental and distinct bush or small tree.

P. fennica (Finnland). This resembles *P. Aria scandica*, but has the leaves pinnatifid towards the base; it is regarded, by Boswell, as a hybrid between that plant and *P. Aucuparia*, of which latter it possesses the sweet-scented flower and other characteristics. Europe (Island of Arran). Tree. SYN. *P. pinnatifida* (Sy. En. B. 485).

FIG. 334. FRUITING BRANCH OF PYRUS BETULÆFOLIA.

P. Chamæmespilus (Bastard Medlar).* Bastard Quince. *fl.* reddish. May and June. *fr.* red, round. *l.* ovate, serrated, glabrous, clothed, when young, with deciduous down. *h.* 5ft. to 6ft. Mountainous parts of Europe, &c., 1683. Shrub. SYNS. *Cratægus Chamæmespilus* (J. F. A. 231), *Sorbus Chamæmespilus.*

P. C. Hostii (Host's). *fl.* rose-pink, in large, terminal corymbs. Spring. *l.* broad-elliptic, obtuse, often lobed, with serrated margins. *h.* 10ft. Tree or shrub. SYNS. *P. Hostii* (Gn., Oct., 1881), *Aria Hostii*, *Cratægus Hostii.*

P. communis (common). Wild Pear. *fl.* 1in. to 1½in. in diameter; cymes simple. April and May. *fr.* pyriform, 1in. to 2in. long. *l.* 1in. to 1½in. long, fascicled on the last year's wood, alternate on the shoots, oblong-ovate, acute, obtusely serrate, more or less pubescent or flocculent below when young; those of the young tree often lobed; petioles slender. *h.* 20ft. to 40ft. Europe (Britain), &c. Shrub or small tree. (Sy. En. B. 488.) Of this species there are several varieties, the following being the most distinct. *See also* **Pear.**

P. c. Achras (Achras). *fr.* rounded at the base. *l.* broader than in the type, acute or cuspidate, flocculent on both surfaces when young. Rare.

P. c. Briggsii (Briggs'). A synonym of *P. cordata.*]

P. c. Pyraster (Pyraster). *fr.* obconical at base. *l.* shortly acuminate, pubescent below when young.

P. cordata (heart-shaped). *fr.* very small, globose or pyriform. *l.* ovate, rounded at base. SYN. *P. communis Briggsii* (J. B. 180).

P. coronaria (crowned).* Sweet-scented Crab. *fl.* rose-colour, large, fragrant, few in the corymb; styles woolly, united at base. May. *fr.* greenish, fragrant. *l.* simple, ovate, often rather heart-shaped, cut-serrate or lobed, soon glabrous. *h.* 20ft. North America, 1724. Tree. (B. M. 2009.) *P. angustifolia* is perhaps a variety of this species.

P. domestica (domestic).* True Service-tree. *fl.* cream-colour, about the size of those of the Hawthorn, panicled. May. *fr.* reddish-spotted, obovate, about 1in. long. *l.* pinnate; leaflets uniform, serrated towards the points, clothed beneath with deciduous, cottony down. *h.* 20ft. to 60ft. Britain. The fruit of this tree, if tasted in an unripe state, is extremely austere, causing a most painful and durable irritation in the throat; but when mellowed by frost or keeping, it becomes brown, soft, and edible, resembling a medlar, though, to most palates, less agreeable. (G. C. n. s., vi. 649.) SYN. *Sorbus domestica* (J. F. A. 447).

P. elæagnifolia (Wild Olive-leaved). *fl.* white, small; pedicels densely tomentose. May. *fr.* small, globose, crowned with the prominent calyx. *l.* lanceolate, oblong-lanceolate, or linear-

P. floribunda (free-flowering).* *fl.* beautiful rich rosy-red, very freely produced. May. *fr.* long-stalked, very small, nearly spherical. *l.* small. Shoots slender. Japan, &c. One of the most ornamental of hardy shrubs. See Fig. 335. (R. H. 1881, 296, under name of *Malus microcarpa floribunda.*)

FIG. 335. FRUITING BRANCH AND DETACHED FRUIT OF PYRUS FLORIBUNDA.

Pyrus—*continued.*

P. floribunda (free-flowering), of Lindley. A synonym of *P. arbutifolia.*

P. grandifolia (large-leaved). A synonym of *P. arbutifolia melanocarpa.*

P. Hostii (Host's). A synonym of *P. Chamæmespilus Hostii.*

FIG. 336. FLOWERING BRANCH OF PYRUS JAPONICA.

P. japonica (Japanese).* *fl.* deep scarlet, solitary or two or three together, produced the greater part of the year; calyx glabrous; lobes short, obtuse, entire. *fr.* green, very fragrant, but not edible, ripening in October. *l.* oval, somewhat cuneate, crenate-serrate, quite glabrous on both surfaces; stipules reniform, serrated. *h.* 5ft. to 6ft. Japan, 1815. Deciduous shrub. Under the genus *Pyrus*, this is the proper name of the plant described in this work as *Cydonia japonica*. See Fig. 336.

FIG. 337. BRANCHLET AND FRUIT OF PYRUS LEUCOCARPA.

P. leucocarpa (white-fruited). *fr.* depressed both above and below; eye not sunk; skin dull white or creamy at maturity. 1879. This tree is very remarkable for the peculiar colour of the fruits. See Fig. 337. (R. H. 1879, p. 365.)

P. Malus. Crab; Wild Apple. *fl.* pink and white, few, 1½in. in diameter; calyx segments woolly; peduncles umbellate. May. *fr.* yellow, 1in. in diameter, sub-globose, indented at the base. *l.* 1in. to 2in. long, oblong, rounded, acuminate or cuspidate at the tip, glabrous or downy beneath when young. Branches spreading. *h.* 20ft. Europe (Britain). Shrub or small tree. *See also* **Apple.**

Pyrus—*continued.*

P. M. acerba (sour). *fl.*, tube of calyx glabrous; pedicels slender, glabrous or nearly so. *fr.* drooping. *l.*, young ones glabrous. SYN. *P. acerba.*

FIG. 338. FRUITS OF PYRUS MALUS BERTINI.

P. M. Bertini (Bertin's). This form is remarkable for the freedom with which its handsome, brightly-coloured fruits are produced. See Fig. 338.

P. M. cratægina (Hawthorn-like). *fr.* with the calyx segments long and persistent, somewhat resembling some of the large-fruited Thorns. *l.* long-stalked, like those of the common Crab in outline. See Fig. 339. (R. H. 1881, 291, under name of *Malus microcarpa cratægina.*)

P. M. mitis (small). *fl.*, pedicels stout, and, as well as the calyx tube and young leaves, pubescent. *fr.* erect.

P. M. præcox (early). This variety is principally interesting by reason of its long-stalked, persistent fruits. (R. H. 1881, 297, under name of *Malus microcarpa præcox.*)

P. M. sempervirens (evergreen). Evergreen Crab. *fr.* short-stalked, round. *l.*, deeply and irregularly toothed, retained on tree sometimes throughout the winter. (R. H. 1881, 296, under name of *Malus microcarpa sempervirens.*)

P. Maulei (Maule's).* *fl.* bright red. April. *fr.* golden-yellow, produced in great abundance, agreeably perfumed, but exceedingly acid to the taste. *l.* somewhat smaller than those of *P. japonica*, and plant dwarfer and more compact in habit. Japan, 1874. One of the most beautiful of recently-introduced shrubs. The fruit makes an excellent conserve. Under the generic name *Pyrus*, this is the correct name of the plant described in this work as *Cydonia Maulei.* See Fig. 340.

P. nivalis (snowy). Snow-tree. *fl.* white, large, shortly-stalked. May. *fr.* rounded or depressed; skin yellowish-green, spotted with brown or red on the sunny side, smooth. *l.* oboval-obtuse, mucronate, crenated at the summit, or lanceolate, entire, covered with a greyish pubescence. Europe, &c. Tree. (B. R. 1482; J. F. A. ii. 107.)

P. pinnatifida (pinnatifid-leaved). A synonym of *P. fennica.*

P. Pollveria (Bollwyllerian). A synonym of *P. Bollwylleriana.*

P. prunifolia (Prunus-leaved). Siberian Crab. *fl.* much resembling those of the common Pear; peduncles pubescent; styles woolly at the base. April and May. *fr.*, when ripe, yellowish, but red on the side exposed to the sun, globose, of an austere taste, decaying like the fruit of the Medlar, and then more palatable. *l.* ovate, acuminate, serrate, glabrous, resembling those of the Cherry-tree, on long petioles. *h.* 20ft. to 30ft. Siberia, 1758. Tree. (B. M. 6158.)

P. salvifolia (Sage-leaved). *fl.* on simple, umbellate pedicels. April and May. *fr.* large, elongated, very useful for making perry. *l.* lanceolate, quite entire, tomentose beneath, when

Pyrus—*continued.*

young velvety above, but in the adult state glabrous. Branches thick. *h.* 20ft. to 30ft. Europe. Tree. (B. R. 1482.) This is simply a form of *P. nivalis*, with somewhat broader leaves.

FIG. 339. FRUITING BRANCH OF PYRUS MALUS CRATÆGINA.

P. sambucifolia (Elder-leaved). *fl.* larger than in *P. americana*; cymes smaller. June. *fr.* larger, when young ovoid, at length globose. *l.* oblong-oval or lanceolate-ovate, mostly obtuse or abruptly short-pointed, serrate (mostly doubly), with more spreading teeth, often pale beneath. Excepting in the above characters, this species resembles *P. americana*, of which it is perhaps a variety. Tree.

P. Sieboldii (Siebold's), of Carrière. *fr.* regularly top-shaped; stalk long, inserted in a shallow basin; eye slightly depressed; skin russet-brown, with pale spots; flesh white, juicy, with a very peculiar flavour. Japan, 1880. Tree. (R. H. 1880, p. 110.)

P. Sieboldii (Siebold's), of Regel. A synonym of *P. Toringo*.

P. Simonii (Simon's). *fl.* numerous, in compact corymbs. Spring. *fr.* yellow, somewhat spherical, 2in. in diameter. *l.* cordate-

FIG. 340. FLOWERING BRANCHES AND DETACHED FLOWER OF PYRUS MAULEI.

Pyrus—*continued.*

ovate, furnished with bristly teeth. China, 1872. A vigorous tree, with upright branches. (R. H. 1872, 28, Fig. 3.)

P. sinensis (Chinese). Sandy Pear; Snow Pear. *fl.* white. April. A tree differing from the European Pear in its "longer, greener branches; larger, more lucid, and almost evergreen leaves; insipid, apple-shaped, warted, very gritty fruit; and a calyx the inside of which is destitute of the down that is found in all the varieties of the European Pear" (Lindley). Very conspicuous in spring, by reason of the glossy, bronzy-red tints of the young leaves. China, 1820. (B. R. 1248; G. C. n. s., iv. 457.)

P. spectabilis (showy).* *fl.* pale red, large, when open semi-double; buds of a deeper hue; umbels sessile, many-flowered; petals ovate, unguiculate; styles woolly at base. April and May. *l.* oval-oblong, serrated, glabrous, as well as the calyx tube. *h.* 20ft. to 30ft. China, 1780. Tree. (B. M. 267.)

P. s. Kaido (Kaido). *fl.* before expansion dull vinous-red; the interior when expanded blush-white, and the exterior blush at the edges, the centre wine-red; very abundant, large. *fr.* numerous, said to be edible after becoming bletted. Japan, 1874.

P. Toringo.* Toringo Crab. *fl.* white or faintly rosy. May. *fr.* very small, long-stalked. *l.* simple or lobed, often almost compound, and much resembling those of some of the Cratægus on the young barren shoots. Japan. Tree or shrub. See Fig. 341. (R. H. 1881, 296, under name of *Malus microcarpa Toringo*.) SYN. *P. Sieboldii* (of Regel).

FIG. 341. FRUITING BRANCH AND DETACHED FRUIT OF PYRUS TORINGO.

P. T. Ringo (Ringo). A free-flowering, ornamental bush or small tree, with, generally, three or four-celled fruits. Leaves generally more incised than in the type. (R. H. 1881, 297, under name of *Malus microcarpa Ringo*.)

P. torminalis (griping). Wild Service. *fl.* numerous, ½in. in diameter. April and May. *fr.* pyriform or sub-globose, greenish-brown dotted. *l.* 2in. to 4in. long, oblong-ovate or cordate, six to ten-lobed, when mature glabrous on both surfaces: lobes triangular, acuminate. *h.* 10ft. to 50ft. Europe (Britain), North Africa. Tree.

Pyrus—*continued.*

P. ussuriensis (Ussuri). *fl.* white; filaments as long as calyx; styles three, free, glabrous. May. *l.* broadly oval, pointed, sharply toothed, fading to a fine brownish-red in autumn. Stalk of roundish fruit about the same length as its diameter. *h.* 20ft. to 30ft. Amurland, &c., 1861. Tree.

PYTHION. A synonym of *Amorphophallus.*

PYTHIUM (from the Greek word *pytho*, I cause to putrefy; plants inhabited by these Fungi soon decay). A genus of Fungi, in which are included a number of species, all of which are parasites in the interior of plants. Some of them are hurtful to certain cultivated plants. There is considerable doubt as to the actual number of distinct species of *Pythium*, as several are probably the same Fungus under different names; *e.g.*, the following have been described as found in Potato plants: *P. Equiseti* (Sadeb.), *P. incertum* (Renny), *P. vexans* (De By.), and *P. proliferum* (De By.). In regard to the first three of these, Mr. W. G. Smith expresses his inability to distinguish them from one another. The genus belongs to a group of Fungi with distinct mycelium, producing sporangia at the tips of the branches, in which zoospores are produced, in the form of fragments of protoplasm, each provided with two cilia; or, rather, the zoospores are formed after the contents of the sporangia flow out into the surrounding water. On the mycelium, sexual reproduction is effected by the formation of a globular cell (the oosphere) on the end of a short branch (oogonium). Near this another small branch forms, and, growing to and piercing the oogonium, fertilises the oosphere, and produces thereby a single resting spore or oospore within it. The very nearly allied genus, *Saprolegnia*, differs from *Pythium* in the zoospores being formed inside the sporangia, and in more than one oospore being formed in each oogonium.

The food or host-plants inhabited by species of *Pythium* belong to widely-separated groups, including Algæ, prothalli, and leafy plants of *Equiseta*, or Horsetails, prothalli of Ferns, and Potatoes. *P. de Baryanum*, a widely-distributed parasite, lives in germinating plants of Clover, Spurrey, Camelina, Maize, &c. This last species renders the lowest part of the young stems soft and tender, and soon causes decay. Its mycelium traverses all the parts that appear withered. In damp air, branches grow out, and form on the tip rounded cells, in some of which are produced zoospores, in others oospores, and on other branches conidia are formed. In whatever way formed, the spores give origin to a mycelium, which bores into suitable food-plants and reproduces the Fungus.

Remedies are hardly to be found, owing to the species of *Pythium* being internal parasites. Diseased plants should be removed and destroyed, to prevent the spread of these or of any other causes of disease.

PYXIDANTHERA (from *pyxis, pyxidos*, a box, and *anthera*, an anther; the anther opening as if by a lid). ORD. *Diapensiaceæ.* A monotypic genus, closely allied to *Diapensia.* The species is a minute, prostrate, creeping herb or sub-shrub. It is a remarkably pretty little plant for the rock garden, and thrives best in very sandy soil, and in sunny situations.

P. barbulata (small-bearded).* Pine-barren Beauty. *fl.* white or rose, solitary, sessile, very numerous; corolla five-lobed, shortly campanulate, the lobes patent and obovate. Early summer. *l.* imbricate, narrow, oblanceolate, entire, bearded at the base, mostly alternate on the sterile branches. *h.* 2in. New Jersey, 1851. (B. M. 4592.) SYN. *Diapensia barbulata.*

PYXIDATE. Furnished with a lid.

QUADRI. A term, used in Latin compounds, signifying four; *e.g.*, Quadrifoliolate, when a petiole bears four leaflets from the same point; Quadrijugate, in four pairs.

QUADRIA. A synonym of **Guevina** (which *see*).

QUAKING GRASS. *See* **Briza.**

QUALEA (the native name in Guiana). ORD. *Vochysiaceæ.* A genus comprising about twenty-five species of curious, stove, resinous trees, natives of Brazil and Guiana. Flowers yellow, pink, or blue, rather large, disposed in lateral and terminal racemes or panicles; sepals five, free; petal one, unguiculate, obovate or obcordate. Leaves opposite or verticillate, coriaceous, petiolate, costate; petioles biglandulose at base. The only species in cultivation—*Q. rosea*—thrives in a compost of peat and leaf mould. Propagation may be effected by seeds, sown on a hotbed; or by cuttings of half-ripened shoots, inserted in sandy soil, under a bell glass, in bottom heat.

Q. rosea (rose-coloured). *fl.*, petal, as well as the large segment of the calyx, white on the outside, rose-coloured on the inside, entire; spur shorter than the calyx. *l.* elliptic, acuminate, glabrous on both surfaces. *h.* 30ft. Guiana. (A. G. 1.) SYN. *Q. violacea.*

Q. violacea (violaceous). A synonym of *Q. rosea.*

QUAMASH, or **CAMASH.** A common name for *Camassia esculenta.*

QUAMOCLIT. Included under **Ipomœa** (which *see*).

QUAQUA (name given to the plant by the Hottentots, who eat the stems raw). ORD. *Asclepiadeæ.* A monotypic genus. The species is an erect, dwarf, branched, and rather bushy, greenhouse succulent, allied to *Boucerosia*, requiring culture similar to **Stapelia** (which *see*).

Q. hottentotorum (Hottentot). *fl.* in fascicles of six to ten or more, along the grooves between the angles of the branches, on very short pedicels; calyx pale green or purplish; corolla pale greenish-yellow, ¼in. in diameter, with five spreading lobes; corona pale yellow, very minute. Older stems 1in. thick, younger ones ½in. to ¾in. thick; angles four, rounded, armed with stout, horizontal or slightly decurved, decussate, brown-pointed teeth. *h.* 4in. to 6in. Plant greyish-green or purplish, glabrous. Namaqualand, 1878. (G. C. n. s., xii. 1.)

QUARTINIA. A synonym of **Pterolobium** (which *see*).

QUASSIA (a name applied by Linnæus to a tree of Surinam, in honour of a negro, Quassi or Coissi, who employed its bark as a remedy for fever). ORD. *Simarubeæ.* A monotypic genus, the species being a lofty, stove tree, more curious than beautiful, and in appearance similar to the common Ash. It thrives in a compost of rich, sandy loam and leaf mould. Propagated by cuttings, made of ripe shoots, and inserted in sand, under a bell glass, in heat.

Q. amara (bitter). *fl.* scarlet, large, tubulose, arranged in terminal clusters. *l.* alternate, impari-pinnate; petioles winged; leaflets opposite, entire. *h.* 20ft. Tropical America, 1790. The wood of this tree is destitute of smell, but has an intensely bitter taste, on which account it was used as a tonic; the root and the bark have also been considered valuable remedies in dysentery. (B. M. 497.)

QUATERNARY, QUATERNATE. Disposed in fours.

QUEBEC OAK. *See* **Quercus alba.**

QUEEN LILY. *See* **Phædranassa.**

QUEEN OF THE MEADOWS. *See* **Spiræa Ulmaria.**

QUEKETTIA (named in honour of the late E. J. Quekett, F.L.S., an excellent botanical observer, and one of our best vegetable anatomists). ORD. *Orchideæ.* A monotypic genus. The species is a singular little epiphyte, of more botanical than horticultural interest. It requires culture similar to **Pleurothallis** (which *see*).

Q. microscopica (microscopic). *fl.* yellow, nearly sessile, cylindrical, ⅛in. long, disposed in a panicle about 3in. long. *l.* terete, subulate, about 3in. long, mottled with light green, deep green, and purple. Brazil.

QUELTIA. Included under *Narcissus.*

QUERCITRON. *See* **Quercus tinctoria.**

QUERCUS (the Latin name). Oak. ORD. *Cupuliferæ*. A well-known genus, comprising nearly 300 species, of mostly hardy trees, rarely shrubs. Flowers monœcious, in unisexual, amentaceous or erect, very rarely androgynous, sessile or sub-sessile spikes; males in catkins, with usually six, sometimes ten to twelve stamens; females solitary, inclosed in imbricating bracts or scales, with a more or less perfect three-celled ovary, very rarely four or five-celled. Nut (glans or acorn) fixed to, or included within, a cup; seed, by abortion, usually solitary. Leaves alternate, annual or perennial, entire, toothed, or lobed, membranous or coriaceous, penni-veined. As acorns do not long retain their germinative powers, it is best to sow them soon after they are ripe. It is of little use trying to import from, or export to, distant countries seeds of any of the species unless these are packed tightly in damp clay or earth. The curious variegated and other forms of the common Oak, &c., must be propagated by grafting. *See also* **Oak**. A selection from the introduced species and their varieties is given below. They are hardy trees, except where otherwise stated. The flowers are usually produced in spring, and the nuts shed in the autumn.

Q. acuta (acute-leaved). *fl.*, catkins flexile, shorter than the leaves, pendulous, solitary or fasciculate; female spikes short. *fr.*, cup hemispherical, with concentric rings; nut ovoid or ellipsoid, apiculate, thrice exceeding the cup. *l.* acute or obtuse at base, elliptic or oblong, abruptly acuminate, entire or undulate-crenate towards the apex, 2in. to 4½in. long, ¾in. to 2in. broad; young ones fulvous-tomentose, older ones glabrous; petioles about 1in. long; stipules ¾in. long, narrow-linear, pilose at back. Japan. Tree or shrub. Of this evergreen species there are two varieties in gardens: *albo-nervis*, with white-veined, and *roseo-nervis*, with red-veined, leaves. (W. & F. 85.) SYN. *Q. Buergeri*.

Q. Ægilops. Ægilops, Vallonea, or Velani Oak. *fl.* greenish-white. *fr.*, cup very large, hemispherical, with lanceolate, elongated, spreading scales; nut brown, very ornamental. *l.* ovate-oblong, with bristle-pointed, tooth-like lobes, hoary beneath. *h.* 20ft. to 50ft. Grecian Archipelago, 1731. Evergreen or nearly so. The cups and acorns are exported from the Levant in large quantities, being in great demand for tanning purposes. (K. E. E. 7.) SYN. *Q. Ungeri* (K. E. E. 13). Of this species, there are two varieties: *latifolia*, with rather broader leaves, and *pendula*, with drooping branches.

Q. agrifolia (scabby-leaved). Enceno Oak. *fl.*, catkins longer than the leaves. *fr.*, cup turbinate, ½in. broad, with adpressed scales, more or less ciliated on their margins; nut ¾in. to 1¼in. long, ovoid-oblong, exserted, acute. *l.* broadly ovate or oval, subcordate, remotely spine-toothed, 1¼in. to 2in. long, seven to eighteen lines broad, chartaceous; adult ones glabrous; petioles ¼in. long. Young branches pubescent. *h.* 20ft. California, 1849. Evergreen. (J. H. S. vi. 157.)

Q. alba (white). American White Oak; Quebec Oak. *fl.*, catkins slender. *fr.*, cup hemispherical-saucer-shaped, rough or tubercled at maturity, naked, much shorter than the nut, which is about 1in. long, ovoid or oblong, with an edible kernel. *l.*, mature ones 3in. to 6in. long, 1in. to 3in. broad, obovate-oblong, obliquely cut into from three to nine oblong or linear, obtuse, mostly entire lobes, smooth, pale or glaucous beneath, bright green above. *h.* 60ft. North America, 1724. A large and valuable, deciduous tree. (B. M. Pl. 250; E. T. S. M. i. 145.) In the variety *repanda*, the leaves are irregularly sinuated or sinuately lobed.

Q. aquatica (aquatic). Water Oak. *fr.* small; cup saucer-shaped or hemispherical; nut dark brown, globular-ovoid. *l.* obovate-spathulate or narrowly wedge-shaped, with a long tapering base, and an often obscurely three-lobed summit, varying to oblanceolate, thick, 1in. to 4in. long, ½in. to 2in. broad; those on seedlings and strong shoots often incised or sinuate-pinnatifid, then mostly bristle-pointed; petioles rarely ¼in. long. *h.* 60ft. to 80ft. North America (near ponds, &c.), 1723. Deciduous. The wood of this species is similar to that of all other North American Oaks.

Q. austriaca sempervirens (evergreen Austrian). A synonym of *Q. glandulifera*.

Q. Ballota (Ballota). Barbary Oak; Sweet Acorn Oak. *fr.*, scales of the cup usually convex at back; kernel of a mild and agreeable flavour. *l.* often rounded at base, dentate or entire, very hoary beneath. South-west Europe, &c.

Q. bambusæfolia (Bambusa-leaved). A synonym of *Q. salicina*.

Q. Banisteri (Banister's). A synonym of *Q. ilicifolia*.

Q. bicolor (two-coloured). Swamp White Oak. *fl.*, catkins pilose. *fr.* borne on peduncles much longer than the petioles; cup hemispherical, about ½in. long, hoary, the upper scales awn-shaped, sometimes forming a mossy-fringed margin; nut scarcely 1in. long, ellipsoid. *l.* obovate or oblong-obovate, wedge-shaped at base, coarsely sinuate-crenate and often rather pinnatifid than toothed, soft-downy and white-hoary beneath, the main primary veins six to eight pairs, lax and a little prominent. *h.* 60ft. North America, 1800. Deciduous. (E. T. S. M. 153.) SYN. *Q. Prinus tomentosa*.

Quercus—*continued.*

Q. Buergeri (Buerger's). A synonym of *Q. acuta*.

Q. Catesbæi (Catesby's). Scrub Oak. *fr.* hemispherical-turbinate half as long as the blackish, ellipsoid nut, with adpressed, slightly silky scales. *l.* 4in. to 7in. long, 3in. to 6in. broad, shortly petiolate, cuneate at base, oblong, deeply cut into three to five unequal, often falcate or spreading, ovate, acuminate lobes, which are subulate-mucronate at the apex, and also sometimes on the margins, the central one trilobed; young ones pubescent, adult ones glabrous. *h.* 15ft. to 30ft. North America, 1823. Deciduous.

FIG. 342. BRANCH OF QUERCUS CERRIS, WITH MALE CATKINS.

Q. Cerris (Cerris).* Bitter, Mossy-cupped, or Turkey Oak. *fl.* greenish-white; catkins pubescent, 1in. to 3in. long; females at the sides of a short peduncle. *fr.* solitary or twin; cup hemispherical, bristly, with elongated, pubescent scales; nut brown, cylindrical, ¾in. to 1¼in. long. *l.* oblong or obovate, variable, sinuate-toothed or often pinnatifid, with obtuse or acute, often mucronulate lobes, very shortly pilose on both sides, rarely stellate above, on very short petioles; stipules narrow-linear, pilose. Young branches pubescent. *h.* 40ft. to 60ft. South Europe, &c., 1735. See Figs. 342 and 343. (W. D. B. ii. 92.)

Q. C. austriaca (Austrian). *l.* on rather long stalks, ovate-oblong, slightly but copiously sinuated, downy and hoary beneath; lobes short, ovate, acute, entire; stipules shorter than the footstalks. *h.* 40ft. South-east Europe, 1824. (K. E. E. 20, under name of *Q. austriaca*.)

Q. C. crispa (curled). *l.* somewhat curled at the edges. Bark corky. *h.* over 60ft.

Q. C. dentata (toothed). A garden synonym of *Q. C. subperennis*.

Q. C. fulhamensis (Fulham). A garden synonym of *Q. C. subperennis*.

Q. C. Lucumbeana (Lucombe). A garden synonym of *Q. C. subperennis*.

Q. C. pendula (pendulous). *l.* narrow, deeply lobed; lobes obtuse or sub-acute. Branches long, pendent or prostrate.

Q. C. subperennis (almost evergreen). *fr.*, scales of the cup ovate, loosely erect. *l.* variable, sometimes incised, sometimes curled, almost evergreen. This variety is also known in gardens as *Q. C. dentata* (W. D. B. 93), *Q. C. fulhamensis* (G. C. n. s., viii. 139), and *Q. C. Lucumbeana*.

Q. C. variegata (variegated). In this variety, the leaves are variegated.

Q. cinerea (ashy-grey). Blue Jack; Upland Willow Oak. *fl.*, catkins 1in. to 1½in. long. *fr.* solitary, sessile or very shortly pedunculate; cup hemispherical-turbinate, with adpressed, silky scales; nut globular, often half as long again as the cup. *l.* acute or obtuse at base, oblong or obovate-oblong, often obtuse, mucronate, entire, sparsely stellate-hairy above, and thickly so below, 1½in. to 3in. long, six to ten lines broad, on very short petioles. North America, 1789. A small, twisted, sub-evergreen tree, rarely exceeding 30ft. in height, the bark yielding a yellow dye. SYN. *Q. Phellos cinerea*.

Q. coccifera (berry-bearing). Kermes Oak. *fl.*, males on long, slender peduncles; females sessile, three to seven, on a rachis eight to fifteen lines long. *fr.* on a short, thick peduncle, sometimes sub-sessile, solitary or twin; cup hemispherical, with

Quercus—*continued.*

velvety, sub-equal scales; nut more or less exserted, rarely included. *l.* elliptic or oblong, cordate at base, or obtuse or rarely acute, sparsely spiny-toothed or mucronate-serrate, or rarely entire, rigid, on short petioles. Branchlets stellately pubescent. *h.* 15ft. South Europe, &c., 1683. Evergreen. The bark of this species is used by tanners, and it sustains an insect like the cochineal, which is used as a crimson dye. (K. E. E. 29; S. F. G. 944.)

FIG. 343. BRANCHLET OF QUERCUS CERRIS, WITH ACORN.

Q. coccinea (scarlet).* *fl.*, catkins pilose. *fr.* top-shaped or hemispherical, with a conical, scaly base, seven to nine lines broad, coarsely scaly; nut ½in. to ⅔in. long, half or more covered by the cup. *l.*, in the ordinary forms (at least, on full-grown trees), bright green, shining above, turning red in autumn, deeply pinnatifid, 3in. to 8in. long, 2in. to 5in. broad; lobes divergent and sparingly cut-toothed; petioles 1in. to 2in. long. *h.* 50ft. North America, 1691. Deciduous. (E. T. S. M. 163.)

Q. conferta (clustered).* Hungarian Oak. *l.* very shortly stalked or almost sessile, 5in. to 7in. or more long, 3in. to 4in. broad, pubescent beneath with stellate hairs, oblong-obovate, tapering gradually to the base, pinnately lobed; lobes oblong, acute, not spine-pointed, entire or slightly lobulate; petioles pilose; stipules longer than the petioles. South-eastern Europe. (G. C. n. s., v. 85.) SYN. *Q. pannonica.*

Q. cupressoides (Cypress-like). A synonym of *Q. pedunculata fastigiata.*

Q. cuspidata (cuspidate). *fl.*, catkins slender, simple or branched, almost equalling the leaves, slightly erect. *fr.* in an alternate, ovoid, acute, fulvous-velvety spike, the scales subverticillate, connate except at the apex, including the nut. *l.* acute or obtuse at base, ovate-lanceolate or oblong, acuminate, entire or undulate-serrate, coriaceous, 1½in. to 3½in. long, seven to fifteen lines broad, on short petioles; young ones pilose, adults glabrous. *h.* 30ft. Japan. Evergreen. (G. C. n. s., xii. 233; S. Z. F. J. 2.) *angustifolia* and *latifolia* are respectively narrow-leaved and broad-leaved forms. *variegata* is a form with prettily-variegated foliage.

Q. densiflora (dense-flowered). *fl.*, catkins dense-flowered, equalling or slightly longer than the leaves. *fr.* one to three on a peduncle shorter than the petioles; cup ½in. long, nearly ⅔in. broad, the outer scales silky, the inner ones adpressed, ¼in. long; nut half-exserted, ovoid, pubescent. *l.* obtuse or rarely acute at base, oblong, ovate, or obovate-oblong, obtuse or sub-acute at apex; margins cartilaginous, revolute, undulated, entire or nearly so; young ones stellately tomentose on both sides. California, 1865. Semi-evergreen tree or shrub.

Quercus—*continued.*

Q. Esculus (Esculus). Italian Oak. *fr.* nearly sessile, solitary or in pairs; cup scaly, hemispherical; nut the size of a small pea. *l.* scattered, aggregated at the top, ovate-oblong, sinuated, smooth, paler beneath, 2in. to 3in. long, not more than 1½in. broad; segments bluntish, somewhat angular at the base. *h.* 20ft. to 30ft. South Europe, 1739.

Q. falcata (sickle-shaped). American "Spanish" Oak. *fl.*, catkins slender, pilose, 2in. to 3in. long. *fr.* solitary or twin, on a very short peduncle; cup saucer-shaped, with a somewhat turbinate base, about half the length of the globose, brown nut, which is four to five lines long. *l.* obtuse or rounded at the base, very variable, three to five-lobed above, greyish-downy or fulvous underneath, 3in. to 5in. long, 2in. to 3in. broad; lobes prolonged, mostly narrow and more or less scythe-shaped, especially the terminal one, entire or sparingly cut-toothed. North America, 1763. A large, deciduous tree, often 80ft. high; bark rich in tannin.

Q. ferruginea (rusty). A synonym of *Q. nigra.*

Q. fruticosa (shrubby). A synonym of *Q. humilis.*

Q. glabra (glabrous). Japanese Oak. *fl.*, male spikes 1½in. to 2in. long, erect, usually solitary, the rachis slightly adpressed-pilose. *fr.* solitary or fascicled and connate at the sides of a peduncle; cup hemispherical, seven to eight lines broad, with cinereous-velvety, adpressed scales, thrice exceeded by the oblong nut. *l.* obovate-oblong, long-narrowed to the base, obtuse at apex, acuminate, entire, glabrous, 2in. to 4in. long, 1in. to 1½in. broad, on petioles nearly ½in. long. Branches glabrous. Japan, 1879. Evergreen. (G. C. n. s. xiv. 785; S. Z. F. J. i. 89.)

Q. glandulifera (gland-bearing).* *fl.*, catkins filiform, loose, pendulous; female spikes hoary-pubescent, longer or shorter than the petioles, few-flowered. *fr.* solitary or few to a peduncle; cup hemispherical, five to eight lines broad, with adpressed, puberulous, lanceolate scales; nut ovoid or ellipsoid, twice or thrice exceeding the cup. *l.* obtuse or rarely acute at base, elliptic, obovate, or lanceolate, acute or acuminate, rarely obtuse, glandular-serrate, 2in. to 5in. long, ¾in. to 2in. broad; young ones adpressedly silky; adults glabrous above; petioles varying from one to six lines long. Japan, 1870. Evergreen. The plant grown in gardens under this name and figured G. C. n. s., xiv. 714, is probably a hybrid from *Q. Cerris subperennis.* SYNS. *Q. austriaca sempervirens, Q. sclerophylla* (of gardens).

Q. glauca (glaucous). *fl.*, catkins loose-flowered, diffuse, solitary or fasciculate, nearly 2in. long, the rachis tomentose. *fr.* solitary or twin, on a very short peduncle; cup hemispherical, four to five lines long, with five to seven concentric, silky lamellæ; nut ovoid-acute, about eight lines long. *l.* acute or slightly obtuse at base, ovate-lanceolate or oblong, acuminate, serrate or undulate-serrate, 2½in. to 5in. long, ¾in. to 2in. broad; young ones much narrowed at base, sparsely pilose above, adpressedly silky beneath. Young branches sparsely pilose. *h.* 30ft. Japan, 1822. Deciduous. Of this species, several varieties are to be found in gardens.

Q. gramuntia (Gramont). A synonym of *Q. Ilex.*

Q. humilis (dwarf). *fr.* sessile or shortly pedunculate; cup shortened, broadly cyathiform, with adpressed, greyish-pubescent scales; nut more or less exceeding the cup. *l.* sometimes persistent, shortly petiolate, ovate, elliptic, or obovate, with irregular, acute or obtuse teeth, 1in. to 1½in. long, ⅓in. to 1in. broad, on very short petioles, sparsely puberulous above, hoary beneath. *h.* 1ft. to 12ft. South-west Europe, 1874. Shrub or under-shrub. (G. C. n. s., i. 113.) SYN. *Q. fruticosa.*

Q. Ilex (Holly).* Evergreen, Holly, or Holm Oak. *fl.* solitary or few on a peduncle, or sub-sessile; cup hemispherical or rarely turbinate, with velvety, erect, more or less adpressed scales, rarely slightly spreading at apex; nut fully twice as large as the calyx. *l.* elliptic, oblong, ovate or lanceolate, acute, toothed or entire, coriaceous, glabrous above, beneath, as well as on the branches, velvety stellate-hoary. South Europe, 1581. A large, evergreen shrub, or low or middle-sized tree, of which there are many varieties. (K. E. E. 38; W. D. B. 90.) SYN. *Q. gramuntia.* The principal forms are: *crispa*, leaves wrinkled at the edges; *fagifolia*, leaves broader and less rigid, more or less undulated, and sometimes slightly serrated; *integrifolia*, leaves lanceolate, entire; *latifolia*, leaves broad and almost entire; *longifolia*, leaves very long and narrow; *serratifolia*, leaves lanceolate, serrated; *Fordii* (SYN. *fastigiata*), habit pyramidal, not spreading as in the type (R. H. 1861, 114).

Q. I. fastigiata (pyramidal). A synonym of *Q. I. Fordii.*

Q. ilicifolia (Holly-leaved). Bear or Black Scrub Oak. *fr.*, cup saucer-shaped, about half as long as the fully-developed nut, turbinate at base; nut brown, ovoid, globular, five to six lines long. *l.* obovate, wedge-shaped at base, angularly five (rarely three to seven) lobed, 2in. to 4in. long, white-downy beneath, rather thick, on slender petioles; lobes short and triangular, spreading. Young branches slightly velvety-hoary. *h.* 3ft. to 8ft. North America, 1800. A straggling, deciduous shrub. (E. T. S. M. 171.) SYN. *Q. Banisteri.*

Q. imbricaria (imbricating). Laurel Oak; Shingle Oak. *fl.*, catkins slender, pilose, 1in. to 1½in. long. *fr.* solitary, sessile or very shortly pedunculate; cup three to four lines long, narrowed at the base, inclosing one-half to one-third of the nearly hemispherical nut, the broad and whitish scales closely adpressed.

Quercus—*continued.*

l. entire, 3in. to 5in. long, lanceolate-oblong, acute or obtuse at each end, mucronate, pale and downy beneath, borne on short petioles. *h.* 40ft. to 50ft. North America. Deciduous.

Q. incana (hoary). *fl.*, catkins slender, often 1in. long. *fr.* solitary, twin, or in threes; cup, when young, covered with ovate, adpressed, pubescent scales; nut ovoid-oblong, half as long again as the cup. *l.* ovate-lanceolate or oblong, obtuse at base, acuminate at apex, remotely serrated except at base, stellate-puberulous above, minutely stellate-tomentose beneath. Young branches velvety-hoary. *h.* 40ft. Nepaul, 1818. Evergreen. SYN. *Q. lanata.*

Q. inversa (inverted-fruited). A synonym of *Q. thalassica.*

Q. lanata (woolly). A synonym of *Q. incana.*

Q. libani (Lebanon). *fr.* solitary, sub-sessile; cup campanulate, ¾in. to 1in. long, with thick, greyish-velvety, adpressed scales; nut broadly ellipsoid, depressed at apex, slightly or twice exceeding the cup. *l.* ovate-lanceolate, acute, obtuse or acute at base, 1½in. to 3in. long, eight to fifteen lines broad, deeply crenate-serrate, glabrous above, the young ones minutely stellate-puberulous beneath. *h.* 30ft. Syria, 1870. (R. H. 1872, 155, and 1877, 172.) The form *pendula* has pendulous branches.

Q. lyrata (lyrate). Over-cup Oak; Water White Oak. *fr.* sessile, 1in. long; cup round-ovate, with rugged scales, almost covering the roundish nut. *l.* 5in. to 8in. long, shortly stalked, crowded at the ends of the branchlets, obovate-oblong, acute at the base, seven to nine-lobed, white-tomentose beneath, or at length smoothish, shining above; lobes triangular, acute, and entire, *h.* 50ft. North America, 1786. Deciduous.

Q. macrocarpa (large-fruited). Burr Oak; Mossy-cup White Oak. *fr.*, cup very variable, especially in size, deep, thick, and woody, conspicuously imbricated with hard and thick, pointed scales, the upper ones awned, so as to make a mossy-fringed border; nut broadly ovoid, 1in. to 1½in. long, half immersed in, or entirely inclosed by, the cup. *l.* obovate or oblong, lyrately pinnatifid or deeply sinuate-lobed, or nearly parted, irregular, downy or pale beneath, 4in. to 15in. long, 2in. to 4in. broad; lobes sparingly and obtusely toothed, or the smaller ones entire. *h.* 30ft. North America. A handsome, deciduous tree. (E. T. S. M. 149.) *Q. olivæformis* is regarded, by Professor Asa Gray, as a mere form of this species, with oblong cups and nuts, and narrower and more deeply lobed leaves.

Q. montana (mountain). A synonym of *Q. Prinus.*

Q. nigra (black).* Barren or Black Jack Oak. *fr.* sub-sessile, solitary or twin; cup top-shaped, coarse-scaly; nut short, ovoid. *l.* broadly cuneate, but sometimes rounded or obscurely cordate at the base, widely dilated and somewhat trilobed (rarely five-lobed) at the summit, occasionally with one or two lateral, conspicuously bristle-tipped lobes or teeth, rusty-pubescent beneath, shining above, 4in. to 9in. long. *h.* 8ft. to 25ft. North America, 1739. Deciduous. SYN. *Q. ferruginea.*

Q. obtusiloba (obtuse-lobed). A synonym of *Q. stellata.*

Q. olivæformis (Olive-shape-fruited). A variety of *Q. macrocarpa.*

Q. palustris (marsh-loving). Pin Oak. *fl.*, catkins pilose; cup flat saucer-shaped, five to seven lines broad, sometimes contracted into a short scaly base or stalk, five-scaled, very much shorter than the ovoid or globose acorn, which is five to seven lines long. *l.* deeply pinnatifid, with divergent lobes and broad rounded sinuses. *h.* 60ft. North America, 1800. Deciduous. (E. T. S. M. 167.)

Q. pannonica (Hungarian). A synonym of *Q. conferta.*

Q. pectinata (comb-like). A synonym of *Q. pedunculata filicifolia.*

Q. pedunculata (peduncled).* *fr.*, cup imbricated; nut oblong; stalk elongated. *l.* oblong, smooth, dilated upwards; sinuses rather acute; lobes obtuse. Branches spreading, tortuous. *h.* 50ft. to over 100ft. Europe (Britain), &c. Deciduous. A sub-species of *Q. Robur.* (Sy. En. B. 1288.) The following are varieties:

Q. p. Concordia (Concordia).* *l.* bright yellow, maintaining their colour throughout the season. In places where this variety succeeds well, it is one of the most effective of golden-foliaged trees. (I. H. xiv. 537.)

Q. p. fastigiata (pyramidal). A handsome tree, with erect, pyramidal branches; in general form it resembles the Lombardy Poplar. (G. C. n. s., xix. 179.) SYNS. *Q. cupressoides, Q. pyramidalis* (of gardens).

Q. p. filicifolia (Fern-leaved). *l.* with narrow lobes almost cut down to the midrib. SYN. *Q. pectinata* (G. C. n. s., xiv. 632).

Q. p. heterophylla (variable-leaved).* *l.* variable in outline, irregularly sinuate or lobed.

Q. p. Hodginsii (Hodgins'). *l.* much smaller than in the type. Habit pyramidal.

Q. p. pendula (pendulous). Weeping Oak. A variety with pendulous branches.

Q. p. purpurascens (purplish). *l.*, young ones almost entirely purple, very striking. Young shoots and footstalks tinged with purple.

Q. p. variegata (variegated). *l.* variegated with purple and white.

Q. Phellos (Phellos).* Willow Oak. *fl.*, catkins slender, half as long as the leaves. *fr.* solitary, sessile or very shortly peduncu-

Quercus—*continued.*

late; cup saucer-shaped, with ovate, adpressed, obtuse, silky scales; nut usually one-half longer than the cup. *l.* acute or obtuse at base, linear-oblong, bristly-acuminate or cuspidate, entire or undulated, light green, 3in. to 4in. long. *h.* 50ft. North America, 1723. Deciduous.

Q. P. cinerea (ashy-grey). A synonym of *Q. cinerea.*

Q. Prinus (Prinus). Chestnut Oak. *fr.* on peduncles shorter than the petioles; cup thick, ½in. to 1in. wide, mostly tuberculate, with hard and stout scales, hoary, about half the length of the edible nut, which is 1in. or less long. *l.* variable, obovate or oblong, with an obtuse or acute base, undulately crenate-toothed, minutely downy beneath; the main primary ribs ten to sixteen pairs, straight, prominent beneath. *h.* 20ft. to 90ft. North America, 1730. Deciduous. SYN. *Q. montana.*

Q. P. tomentosa (tomentose). A synonym of *P. bicolor.*

Q. pseudosuber. Bastard Cork-tree; False Cork Oak. *fl.*, male catkins numerous, 2in. long; female flowers scattered. *fr.* few, shortly pedunculate or sub-sessile; cup ½in. to 1in. long, hemispherical or obovoid-turbinate; scales greyish-pubescent, at length spreading or reflexed; nut often twice as long as the cup. *l.* obtuse or acute at base, ovate or oblong, 2½in. to 3in. long, shortly petiolate, toothed or crenate, mucronate, above sparsely, and below thickly, white-pubescent; stipules narrow-linear, pubescent. *h.* 50ft. South Europe, 1824. Evergreen. (K. E. E. 35.) SYN. *Q. Turneri.*

Q. pyramidalis (pyramidal). A garden synonym of *Q. pedunculata fastigiata.*

Q. pyrenaica (Pyrenean). A synonym of *Q. Toza.*

Q. reticulata (netted). *fr.* on long peduncles; cup hemispherical, pubescent, two to four lines long, with adpressed scales; nut semi-exserted. *l.* shortly petiolate or sub-sessile, sub-cordate or cordate at base, obovate, rounded at the apex, 2in. to 4in. long, 1½in. to 3in. broad, mucronate, crenate-denticulate, or almost entire, glabrescent above, fulvous-tomentose and reticulated beneath. Young branches yellow-tomentose. *h.* 10ft. Mexico, 1840. Half-hardy evergreen.

Q. Robur (Robur). Black Oak; Common Oak. Under this name Hooker, De Candolle, and other eminent authorities, include *Q. pedunculata* and *Q. sessiliflora*, the British representatives of the genus, as sub-species; but, for garden purposes, it is desirable here to accord them specific rank. *See also* **Oak.**

Q. rubra (red).* Champion or Red Oak. *fr.*, cup saucer-shaped or flat, with a narrow, raised border (¾in. to 1in. in diameter) of rather fine, closely adpressed scales, sessile or on a very short and abrupt, narrow stalk or neck, very much shorter than the oblong-ovoid or ellipsoid nut, which is 1in. or less in length. *l.* acute or often obtuse at the base, elliptic or oblong, rather thin, moderately (rarely very deeply) pinnatifid, turning dark red after frost. Bark of trunk dark grey, rather smooth. North America, 1769. A large tree. The wood is reddish and coarse-grained. (E. T. S. M. 169.)

Q. salicina (Willow-like). Willow Oak. *fl.*, catkins shorter than the leaves. *fr.* solitary, on a short peduncle; cup shortly hemispherical, ¾in. broad, with five or six concentric zones; nut ellipsoid, much exserted. *l.* shortly petiolate, slightly acute or obtuse at base, acuminate, entire or remotely serrate-denticulate, coriaceous, glabrous above, and beneath when old; young ones adpressedly pilose beneath. Young branchlets pubescent. Japan, 1860. Evergreen shrub. SYN. *Q. bambusæfolia.*

Q. sclerophylla (hard-leaved), of Lindley. *fr.* sessile, approximating; cup sub-globose, ½in. broad, tomentose, with adpressed scales; nut slightly protruding, pubescent. *l.* petiolate, ovate or elliptic, sub-acute at base, obtuse and narrowed at apex, deeply serrate, 3in. to 6in. long, 1¼in. to 3in. broad, glabrous above, glaucous-pubescent beneath. Branches glabrous. North China, 1850. Evergreen shrub. (L. & P. F. G. i. 59.)

Q. sclerophylla (hard-leaved), of gardens. A synonym of *P. glandulifera.*

Q. serrata (serrated).* Japanese Silkworm Oak. *fl.*, catkins loose, pendulous, 1in. to 2in. long; females in the axils, solitary or twin. *fr.*, cup hemispherical, seven to twelve lines broad, with greyish-velvety scales, larger at the base; nut ellipsoid, scarcely exceeding the cup. *l.* obtuse or rarely acute at base, oblong or lanceolate, acute or rarely obtuse, crenate-serrate, with long, bristly teeth, 2in. to 8in. long, ½in. to 2in. broad, on petioles ⅓in. to 1in. long; young ones slightly silky; adults glabrous. Young branches silky-pubescent. *h.* 6ft. Japan. Half-hardy evergreen. (W. & F., Dec. 12, 1883.)

Q. sessiliflora (sessile-flowered).* *fr.* sessile, or on a usually shortened peduncle; nut oblong. *l.* on more or less elongated petioles, oblong, smooth; sinuses opposite, rather obtuse; lobes acute. *h.* 60ft. Britain. Deciduous. A sub-species of *Q. Robur.* It may be distinguished from the closely-allied *Q. pedunculata* by its less tufted appearance, the paler green of its foliage, its less tortuous spray and branches, the lighter-coloured bark, the larger buds, and by the stalked leaves being frequently retained, after withering, until the following spring. The wood of *Q. sessiliflora* is, moreover, darker, heavier, and more elastic than that of *Q. pedunculata*; the acorns, too, are sessile, or very shortly stalked. (Sy. En. B. 1289.)

Quercus—*continued.*

Q. s. cochleata (shell-shaped). The edges of the leaves in this form are curved upwards, and the upper surface is thus rendered more or less shell-shaped.

Q. s. Louetti (Louett's).* *l.* long, narrow, almost sessile, narrowed to both ends, about 5in. long and less than 1in. broad.

Q. s. rubicunda (rubicund). *l.* rather deep red, especially in the earlier part of the summer.

Q. Skinneri (Skinner's). *fl.*, catkins pubescent. *fr.* very distinct, large, on a peduncle two to six lines long; cup flat-patelliform, 1¼in. to 1½in. broad, with adpressed, ovate-deltoid, sub-velvety scales; nut 1½in. long, and as much broad at base, globose-ovoid. *l.* long-stalked, ovate or sub-lanceolate-oblong, acute or obtuse at base, acuminate at apex, bristly-toothed on the margins and at apex; young ones slightly puberulous; adults glabrous. Young branches glabrous. Mexico. Shrub. (G. C. 1841, p. 116.)

Q. stellata (starry). Post Oak. *fr.*, cup deep saucer-shaped, naked, one-third or one-half the length of the nut, which is ovoid in shape, ½in. to ¾in. long. *l.* greyish or yellowish-downy beneath, pale and rough above, thickish, sinuately cut into five to seven rounded, divergent lobes, the upper ones much larger and often one to three-notched. North America, 1819. A deciduous tree, rarely exceeding 50ft. in height. (E. T. S. M. 151.) SYN. *Q. obtusiloba.*

FIG. 344. FRUIT AND LEAVES OF QUERCUS SUBER.

Q. Suber (probably derived from *suphar*, bark).* Cork Oak; Cork-tree. *fr.* often solitary, pedunculate or sessile; cup obovate-hemispherical, obconical or rarely obtuse at base, ½in. to ¾in. long, and more broad, with velvety, erect and adpressed scales; nut often exceeding the cup by one-half. *l.* usually 1in. to 2in. long, ½in. to 1¼in. broad, on petioles two to six lines long, ovate, oval, or oblong, acute, toothed or rarely entire, glabrous above, beneath, as well as on the branchlets, stellate-velvety-hoary. Bark suberose. *h.* 25ft. South Europe, 1581. This evergreen tree furnishes the cork of commerce. See Fig. 344. (K. E. E. 33; W. D. B. 80.)

Q. thalassica (sea-green). *fl.*, catkins elongated, dense, pilose. *fr.* many, approximating, sessile in spikes, on peduncles 2in. to 3in. long; cup five lines broad, shortly hemispherical, tomentose, with adpressed, mucronate scales; nut obovoid, eight lines in length, long-exserted. *l.* acute or acuminate at base, elliptic or obovate-oblong, slightly obtuse, acuminated, 3in. to 5in. long, ½in. to 1⅓in. broad, entire or slightly serrated near the apex, very glabrous above, glaucous-tomentose beneath. Branches tomentose. China, 1850. Evergreen shrub. SYN. *Q. inversa* (L. & P. F. G. i. 36).

Q. tinctoria (dyers'). Quercitron; Black, Dyers', or Yellow-barked Oak. *fr.*, cup flat beneath; nut globose. *l.* downy beneath, obovate-oblong, dilated, widely sinuated, large, turning brownish, orange, or dull red, in the autumn, resembling those of *Q. coccinea*, but having fewer lobes; lobes short, obtuse, slightly

Quercus—*continued.*

toothed, bristle-pointed. Bark dark-coloured and rough. *h.* 80ft. to 100ft. United States, 1800. (B. M. Pl. 251.)

Q. Toza (Toza).* *fr.* sessile or shortly pedunculate; cup hemispherical, four to six lines long, with loose, adpressed scales, pubescent outside; nut two to four times longer than the cup, ovate-ellipsoid. *l.* ovate or oblong, 2in. to 4in. long, ½in. to 1⅔in. broad, variously pinnatifid, stellato-pilose above, very densely stellato-rufous-tomentose beneath; lobes ovate or oblong, obtuse. South Europe, &c. Deciduous. (K. E. E. 22.) SYN. *Q. pyrenaica.*

Q. Turneri (Turner's). A synonym of *Q. pseudosuber.*

Q. Ungeri (Unger's). A synonym of *Q. Ægilops.*

Q. virens (green). Live Oak. *fr.* one to three on usually conspicuous peduncles; cup turbinate, five to eight lines long, greyish, with adpressed, slightly velvety scales; nut oblong, exceeding the cup by one-half or more. *l.* 1in. to 3in. long, ½in. to 1¼in. broad, oblong-elliptical, hoary beneath as well as on the branches, entire or irregularly lobed-dentate. *h.* 40ft. or more. North America, 1737. Evergreen.

QUERNALES. A name given to plants which agree in general characters with *Quercus.*

QUESNELIA (named in honour of M. Quesnel, a French Consul at Cayenne, who was the means of introducing the genus to Europe). SYN. *Lievena.* ORD. *Bromeliaceæ.* A small genus (three or four species) of stove, herbaceous, Brazilian plants, allied to *Billbergia.* Sepals free above the ovary, ovate, imbricated; petals free, narrow, the apex dilated into a spreading lamina; stamens three, alternating with the petals; inflorescence cone-like, simple, ovoid or oblong, thick; peduncle terminal, tall, clothed with spathe-like scales. Leaves clustered, long, spinuloso-serrated. For culture, *see* **Billbergia.**

Q. roseo-marginata (rose-margined). This is the correct name of the plant described in this work as *Billbergia rosea-marginata.*

Q. rufa (red). This is the proper name of the plant described in this work as *Billbergia Quesneliana.*

Q. Van Houttei (Van Houtte's). *fl.* white, cobalt-blue at the tips, crowded in many series, each subtended by a bract; bracts rose-coloured above, and clothed below with white down; inflorescence a large, cylindrical spike, borne on a scape 1½ft. to 2ft. high. *l.* numerous, armed with strong spines, sometimes banded with white beneath. (B. H. 1881, 18.)

QUICKTHORN. A common name for *Cratægus Oxyacantha.*

QUILLAI-TREE. *See* **Quillaja saponaria.**

QUILLAJA (from the Chilian name, *Quillai* or *Cullay*). SYN. *Smegmadermos.* ORD. *Rosaceæ.* A small genus (three or four species) of very glabrous, greenhouse, evergreen trees, some remarkable in possessing a soap-like bark; they are natives of South Brazil, Chili, and Peru. Flowers rather large, tomentose; lateral ones male, central ones purplish; calyx coriaceous, persistent, five-lobed, valvate; petals five, small, sessile, spathulate; pedicels bibracteolate; peduncles axillary and terminal, three to five-flowered. Leaves scattered, petiolate, simple, thickly coriaceous, almost entire, veined. The bark of the under-mentioned species contains a considerable amount of carbonate of lime and other mineral substances, also saponine, a vegetable-soap principle, on which account it is used for washing and cleaning clothes, &c. For culture, *see* **Kageneckia.**

Q. saponaria (Soapwort). Quillai, or Soap Bark-tree. *fl.* white, usually terminal, either solitary or from three to five on a stalk. April. *l.* oval, mostly toothed, smooth, shining, short-stalked. *h.* 50ft. to 60ft. Chili, 1832. (R. H. 1873, 254.)

QUINARY, QUINATE. Disposed in fives.

QUINCE (*Cydonia vulgaris*). The Quince is a native of Northern Persia, but naturalised throughout the Mediterranean region, &c., whence it was long since introduced to this country. It forms a spreading, deciduous tree, the branches of which are usually much contorted. The fruits emit a powerful and rather peculiar perfume when ripe, and are exceedingly acid and astringent in a raw state. They are chiefly used for making a kind of marmalade, and other preserves, and for adding, in small

Quince—*continued.*

quantities, to Apples when cooking, to give briskness and increased flavour. The chief use of the Quince-tree is, perhaps, that of providing stocks whereon to graft Pears. It is naturally inclined to root near the surface, and the roots are fibry, in comparison with those of the Pear itself, which is also used. The Quince stock possesses, in most instances, the valuable property of dwarfing the growth of Pear-trees, and causing them to become more productive than they would be on their own roots; hence, it is extensively and most successfully used for this purpose (*see* **Pear**). Most orchards—in all the southern parts of the country, at least—are furnished with one or more specimens of Quince. The trees seldom perfect their fruit northwards.

FIG. 345. FRUIT AND LEAVES OF PORTUGAL QUINCE.

Propagation is most generally effected by cuttings and by layers; by seeds also, when any are obtainable. Cuttings of the current year's wood, with a heel of two-year-old wood attached, may be inserted in the open ground, early in autumn. They soon root, and will be ready for grafting or budding about the second, or sometimes the third, year afterwards. Layers may be obtained in quantity from an old stool that has been cut down. Young shoots proceed from the base, and when firm enough, the following autumn, these may be layered, or the stock itself covered with soil, into which the new growths will root. The following autumn, they may be detached and planted in nursery rows, and the next year other young ones will again proceed from the stock, which may, in turn, be similarly treated.

The Quince is not naturally inclined to grow straight and upright; to get standard trees, therefore, considerable attention and encouragement are necessary in training to get a vigorous and tolerably straight stem. As a stock, the Quince is not much required to form standards: the straight stem may be obtained, as a rule, more easily by adopting a system of double-grafting, as described under **Pear.**

Quince-trees succeed best in rather moist situations, where the soil is rich and somewhat light, not of a heavy, clayey nature. An open, sunny situation is necessary where the ripening and perfecting of fruit is of importance. The fruits may be allowed to hang on the tree until the approach of frost: they are seldom ripe before the end of October. When gathered, they should be laid on clean straw, or on a cool fruit-room shelf, away from other specimens of fruit, until becoming quite yellow, when they will be fit for use.

Quince—*continued.*

There are only three principal varieties of Quince cultivated for the use of their fruits. These are enumerated below.

Apple-shaped. Fruit roundish, somewhat similar to an apple, of a rich golden colour when ripe. Tree very productive.

Pear-shaped. Fruit pyriform, rather larger than the preceding, and later in ripening; skin also paler-coloured, and rather woolly. This is the variety most commonly grown.

Portugal. Fruit very large, sometimes 4in. long and 3in. in diameter at the thickest part, elongated, and often irregular in outline; skin deep yellow, thickly covered with a woolly substance. This variety is superior in flavour to either of the others, but the tree is not so productive. It grows very vigorously. See Fig. 345.

QUINCE, BENGAL. *See* **Ægle.**

QUININE PLANTS. The principal of these are several species of *Cinchona*, viz., *C. Calisaya*, *C Ledgeriana*, *C. officinalis*, *C. succirubra*, &c.

QUINQUE. A term, used in Latin compounds, signifying five; *e.g.*, Quinquefoliolate, five-leaved; Quinquenerved, applied to a leaf having five ribs all proceeding from the same point of the base.

QUINSY-BERRY. The fruit of *Ribes nigrum.*

QUINTILIA. A synonym of **Stauranthera** (which *see*).

QUISQUALIS (from *quis*, who, and *qualis*, what kind; it was uncertain, when the name was given, to what class or order the genus belonged). ORD. *Combretaceæ.* A genus consisting of two species of stove, climbing shrubs, with slender branchlets, natives of

FIG. 346. FLOWERING BRANCHLET OF QUISQUALIS INDICA.

tropical Asia and tropical and South Africa. Flowers white or red (colours variable), showy, disposed in short, axillary and terminal spikes, sometimes racemose; calyx tube produced a considerable length above the ovary; petals five, large or small, obtuse. Fruit rather large, dry, oblong, coriaceous, five-winged, one-seeded. Leaves opposite or nearly so, membranous, oblong or obovate,

Quisqualis—*continued.*

acuminate, entire. *Q. indica* thrives in a compost of peat and loam, the latter preponderating. Propagation may be effected by cuttings of the young shoots, taken off with a heel, and inserted in sand, under a bell glass, in bottom heat. The other species, *Q. parviflora*, a native of Natal, is not in cultivation.

Q. glabra (smooth). A synonym of *Q. indica.*

Q. indica (Indian).* Rangoon Creeper. *fl.* varying in colour from orange to red, beautiful, sweet-scented; petals oval-oblong, adpressedly pubescent. May to August. *l.* ovate, acuminate. Tropical Asia and Africa, 1815. Plant pubescent or glabrous. See Fig. 346. (B. M. 2033; B. R. 492.) SYNS. *Q. glabra, Q. pubescens, Q. sinensis* (B. R. xxx. 15).

Q. pubescens (downy). A synonym of *Q. indica.*

Q. sinensis (Chinese). A synonym of *Q. indica.*

QUIVER-TREE. A common name for *Aloe dichotoma.*

QUIVISIA (*Bois de Quivi* is the name given in the Isle of France). ORD. *Meliaceæ.* A genus comprising five species of stove trees and shrubs, natives of the Mauritius and Madagascar. Flowers axillary, solitary or shortly cymose; calyx cupular, four or five-toothed, persistent; petals four or five, oblong or linear, valvate or imbricated. Leaves sub-opposite or alternate, simple, entire or pinnately lobed on the same branches, shining above, reticulately veined. *Q. heterophylla*—the only species introduced—requires a compost of sandy loam and fibry peat. It may be increased by cuttings of ripened shoots, inserted in sand, under a glass, in brisk bottom heat.

Q. heterophylla (variable-leaved). *fl.* white; pedicels twin, axillary, one-flowered. *l.* alternate, oval or obovate, entire, sinuate-toothed or pinnatifid. *h.* 10ft. to 15ft. Mauritius, 1822. This is placed, by Baker, together with several other forms, which have been described as species, under *Q. mauritiana.*

RACE. "A variety of such fixity that it is reproduced by seed; also used, in a looser and more extended sense, for a series of related individuals, without particular regard for rank" (Asa Gray).

RACEME. An inflorescence in which the flowers are arranged singly, on distinct pedicels, along a common axis.

RACEMIFEROUS. Bearing racemes.

RACEMOSE. In racemes; having the appearance or character of a raceme.

RACHIS, or **RHACHIS.** The axis of an inflorescence or of a compound leaf.

RADEMACHIA. A synonym of *Artocarpus.*

RADIATE. Spreading from, or arranged around, a common centre, or around the circumference of a circle; *e.g.*, the arms of an umbel, or the ligulate florets of Composites.

RADICAL. Of, belonging to, or proceeding from, a root, or from a root-like portion of stem at or below the surface of the soil.

RADICANT. Rooting.

RADICEL, RADICELLA. A minute root; a rootlet. The tiny roots which appear on a young plant at the time of germination.

RADICIFLOROUS. Apparently flowering from the root.

RADICLE. The first root of a plant, rudimentary in the embryo.

RADICOSE. Having a large root.

RADISH (*Raphanus sativus*). A hardy annual, cultivated from a very early period, principally for the use of its fleshy roots in salad preparations; the seed-

Radish—*continued.*

pods are also sometimes used for pickling, when they are young and green. Radishes are very popular, and much esteemed for salading, especially in spring and during early summer, when they grow quickly. They are only really tender and fit for eating during a limited period, from the time the roots are large enough to use until the tops form a few rough leaves, and show signs of starting a flower-stem. At this stage, the roots become stringy, and have a hot flavour. The chief point in the culture of Radishes for maintaining a supply is that of sowing a small quantity frequently, to insure a succession. Few plants are more easily grown, or arrive more quickly at a stage ready for use. The early spring supplies are generally grown in frames by themselves, or along with Asparagus or Potatoes that are being forced. A slight bottom heat, from fermenting material, is sufficient to insure germination; afterwards, air must be admitted as the weather permits—a temperature of 50deg. in the frame is ample. The seeds are generally best sown broadcast, either in frames or the open ground, except those intended for winter consumption, which may be placed in shallow drills, 6in. or 8in. apart. Sowings may be made in warm positions outside early in the year, for the purpose of obtaining crops to be used along with, or independent of, those from frames. From January to April, the young plants will require protection during frosty and any unfavourable weather: this may be afforded by bending sticks over and laying mats upon them. From March onwards, sowings should be made outside about every fortnight, supposing the produce is required: this insures a succession. Radishes succeed in any light soil; it should be dug deeply, and be raked fine on the surface before the seeds are sown. Winter Radishes require to be sown in July or August, and the plants thinned afterwards to about 4in. apart. For summer, a cool, shady position should be selected; a warm, sheltered situation is best suited at all other seasons. Birds are very fond of Radish seed; consequently, it must be protected for a time, wherever sown. Throughout summer, the young plants require frequent waterings: if this is neglected in dry weather, they soon run to seed, and the roots are then of no use.

FUNGI. The Fungi parasitic on Radishes call for but a short notice, since only one or two of them ever do much damage; and all of them grow also on other cultivated *Cruciferæ*, including Cabbages and Turnips. The worst are the White Rust (*Cystopus candidus*) and Mildew (*Peronospora parasitica*). The former produces white patches on the leaves, and also grows on and deforms the flowers, causing an enlargement of all their parts, and rendering them sterile (*see* **Rusts**). The Mildew (*see* **Peronospora**) is much less noticeable in its effects, but is not less hurtful to the plants.

INSECTS. Radishes are apt to suffer from the ravages of the same insects as feed on Turnips. Roots of Radishes are eaten by the usual subterranean foes that attack other fleshy roots. Among these are *Julus* and other **Millipedes** (which *see*), and the larvæ of certain *Noctuæ*, or Night Moths. The most dangerous of the foes that live on the roots are the larvæ of several species of flies that belong to the same genus as the **Onion Fly** (which *see*). All of these larvæ eat the roots of other *Cruciferæ* also, *e.g.*, Cabbage; but one species (*Anthomyia radicum*) has received the name of Radish Fly, from its preference for this plant. This fly is very common throughout the summer. Its body is about ⅛in. long, and its spread of wings from ⅓in. to ½in. The body is covered, not very thickly, with stiff hairs. The male has the thorax black, with two short, grey, narrow stripes lengthwise; the abdomen is grey, with a black line down the middle and three black lines across it; the forehead is white, with a black, triangular spot; the face is whitish-ochreous; the legs and antennæ are black; the wings

Radish—*continued.*

are transparent, and the third and fourth veins in each converge slightly. The female differs from the male in the broader body, and the ash-grey colour; the stripes on the thorax are faint-coloured, and there is only a slender, dark line down the middle of the abdomen. The larvæ have neither head nor limbs, but are blunt behind, and taper to a point in front. They are yellowish, fleshy, and wrinkled. On the blunt hinder end are several fleshy lobes, and breathing-pores in two groups of three each. The larvæ eat into the roots, and cause them to rot. When full-fed, they leave the roots, and change, in the soil, into dull ochreous pupæ of the form

FIG. 347. CHINA ROSE RADISH.

usually met with in *Diptera*. The larvæ of *Anthomyia floccosa*, Macq. (? *A. floralis*, Fall.), also feed in the roots of Radishes, Cabbages, and allied plants, as do likewise the larvæ of *A. Brassicæ* (*see* **Cabbage Fly**) and of *A.* (*Homalomyia*) *caniculariş*; and those of *A. Raphani* feed on Radishes in North America. All of these insects are very like the Radish Fly, and it is unnecessary to describe them, since the habits of all are much the same in all stages. The larvæ have been found in large numbers feeding in dung, and the insects have been reared from this. It has also been observed that when ground is manured with farmyard dung, the root-crops are apt to suffer from the attacks of larvæ of these flies.

Remedies. The most effectual seems to be crude carbolic acid, in solution. Successful results have followed its use, in the strength of half a pint of acid mixed with one gallon of boiling water, to which about a quart of soft soap has been added. This should be diluted with fifty gallons of water; or it may be used even in a weaker solution. The plants should be watered with this fluid every week, after they appear above ground. Instead of this, much-diluted gas-water may be used; or gas-lime may be sprinkled along the rows. Farmyard manure is not safe, if there are maggots in it; mineral manures may be substituted in their stead.

Radish leaves are occasionally eaten by larvæ of the White Butterflies (**Cabbage Caterpillars**), and of various Moths (**Mamestra, Plusia, Potherb Moths**), as well as by the **Turnip Flea** (*Phyllotreta nemorum*), and by other small beetles allied to it. The seeds are destroyed in the fruits by larvæ of *Ceuthorhynchus*

Radish—*continued.*

assimilis (**Turnip-seed Weevil**), which is closely allied to the Weevils that make galls on roots of Cabbage, Turnip, Charlock, and Wild Mustard. For the nature of the injuries in each case, and for the appropriate remedies, *see* the heading quoted for each.

SORTS. Of these there are many in commerce which may be classed as Long-rooted and Turnip-rooted varieties. There are also intermediate globular forms, and these are much esteemed. The following varieties are amongst the best:

BLACK SPANISH, an excellent hardy sort for autumn and winter use. CHINA ROSE, root oblong or somewhat conical, bright rose-coloured; also a fine variety for autumn and winter (see Fig. 347). EARLY FRAME (Wood's), one of the earliest, shorter than the LONG SCARLET, of which it is a sub-variety; fine for forcing. EARLY ROSE GLOBE, a very early and much-esteemed sort, of a fine,

FIG. 348. EARLY ROSE GLOBE RADISH.

clear rosy-scarlet, compact (see Fig. 348). FRENCH BREAKFAST, a beautiful olive-shaped variety, with white tip, of quick growth, and very mild flavour; one of the best for forcing and summer use. LONG SCARLET, SHORT-TOP, one of the best and most esteemed long varieties, because of its bright colour; much cultivated for market. OLIVE SCARLET, an excellent sort, of quick growth and fine colour. RED TURNIP-ROOTED, crisp, and of mild flavour; very extensively grown for market, and well adapted for general summer use, because it withstands dry weather. WHITE TURNIP-ROOTED has a white skin, but otherwise differs very little from the red variety; it is equally good, but the colour of the latter is generally preferred.

RADIUS, RAY. The circumference of the circle formed by umbels or heads, or of other such parts.

RADIX. The root; the descending axis; that part which is the development of a radicle. It differs from a stem, not only in its origin, but in not branching symmetrically, and in having no normal leaf-buds.

RAFFIA OR ROFFIA PLANT. *See* **Raphia Ruffia** and **R. tædigera.**

RAFNIA (named in honour of C. G. Rafn, a Danish botanist, who wrote a Flora of Denmark, in 1796). ORD. *Leguminosæ.* A genus comprising twenty-two species of glabrous, and often glaucous, greenhouse shrubs or sub-shrubs, confined to South Africa. Flowers yellow, solitary or shortly racemose, terminal or in the axils of bracts; calyx unequally five-fid, the lowest segment narrowest; corolla glabrous; standard roundish; keel incurved, rostrate or obliquely truncate. Pods linear or lanceolate. Leaves simple, entire, one-nerved or reticulate-veined. The species, a selection of which is given below, thrive in a compost of fibry loam and sandy peat, with the addition of pieces of charcoal and broken pots, to keep the whole rough. Attention to drainage is an important point. Propagation may be effected, at the beginning of summer, by cuttings of firm side shoots, inserted in sand, and covered with a bell glass; or, in spring, by seeds, sown on a hotbed.

R. angulata (angular-branched). *A.*, upper and lateral calyx lobes nearly as long as the calyx tube or somewhat longer; flowering branchlets forked. May. *l.* ¾in. to 1¼in; long, oblong-

Rafnia—*continued.*

cuneate, lanceolate, linear-lanceolate, or linear-filiform, sub-obtuse or acute. Branchlets angular. *h.* 1ft. to 1½ft. 1816. Sub-shrub. SYN. *R. filifolia.*

R. elliptica (elliptic-leaved). *fl.*, peduncles axillary, one-flowered, with a pair of leafy bracts under the flower. June. *l.* 2in. to 3in. long, broadly obovate, elliptical, oblong, or ovate-lanceolate, acute or obtuse and mucronate; upper ones narrow and more lanceolate, all narrowed at base. Branches angular. *h.* 1ft. to 3ft. 1819. Shrub.

R. filifolia (thread-leaved). A synonym of *R. angulata.*

R. triflora (three-flowered).* *fl.*, keel about twice as long as the calyx tube; peduncles axillary, one to three together, leafless, or branched and leaf-bearing. June. *l.* 1½in. to 3in. long, roundish-obovate, elliptical or ovate-lanceolate, acute or mucronulate, obtuse at base. Branches angular or two-edged. *h.* 2ft. to 4ft. 1784. Shrub. (B. M. 482, under name of *Crotalaria triflora.*)

RAGGED ROBIN. *See* **Lychnis Flos-cuculi.**

RAGWEED, or **RAGWORT.** *See* **Senecio Jacobæa.**

RAGWORT. *See* **Othonna.**

RAILLARDIA (named in honour of A. M. L. Raillard, an officer in the French Marine service). ORD. *Compositæ.* A genus comprising nine species of greenhouse shrubs, confined to the Sandwich Islands. Flower-heads yellow, rayless, mediocre or small, racemose or corymbose at the apices of the branches; involucre cylindrical or narrow-campanulate, with one series of connate or at length free bracts; receptacle small, convex or sub-conical, naked or setose-fimbrilliferous; achenes narrow, glabrous, or slightly pilose. Leaves opposite, ternately whorled, or alternate, sessile, entire, coriaceous, at length shining. For culture of the only species introduced—now probably lost to gardens—*see* **Senecio.**

R. ciliolata (fringed-leaved). *fl.-heads* five to eight, clustered in a paniculate corymb; achenes sub-tetragonal, attenuated at base. July. *l.* ternately whorled, lanceolate, glabrous on both sides, rather more than ½in. long, shortly ciliated on the margins. Branches velvety-pubescent. *h.* 2ft. 1865. (B. M. 5517.)

RAIN. A familiar example of the origin and nature of Rain is seen in the formation of a miniature shower, when steam escapes from a steam-engine into the air. When water is heated, it becomes an invisible vapour; and this rises, and mixes with the air, if the air is warm. When the warm air, full of water in this state, mixes with cold air, or touches any cold object, the vapour returns to the state of water; but, for a time, it remains in the form of very small particles, like fine dust—so light, that they can still float in the air. In this state, they form clouds when high above the earth, or mist when lying close to the earth. Among mountains, clouds and mists are often seen to be directly continuous. But mists often cling to the mountain-tops while the sky is nearly cloudless. This is owing to the rocks and soil being colder than the air, and causing the vapour to become visible as mist, by cooling the air near them below the temperature at which the water can remain vapour. As the wind carries the mist from the mountain into the warmer air around, it resumes the form of vapour, and becomes invisible; but new mist is formed, and supplies the place of that carried away, so that the mist seems to remain unchanged on the peaks for hours. Clouds form and disappear in the sky according as the air filled with vapour meets colder or warmer winds. When the minute drops of water that form clouds are very crowded, they join together, and form drops, too large to be supported in the air. These then fall as Rain. Sometimes, a cloud will be seen raining high up in the sky, though Rain does not reach the ground. This happens when the Rain has to fall through a layer of warm, dry air, in which it is all turned into vapour again. Light Rain sometimes falls out of a sky cloudless or nearly so; but this is a rare occurrence. The greater amount of rainfall during the night is due to the cooling of the air when the sun's heat is withdrawn. The vapour

Rain—*continued.*

forms drops of water, and falls as Rain. The sources of the vapour in the air are various. Much of it is given off by growing plants, and a little by animals. More is taken up by warm, dry winds blowing over the surface of the land, with its marshes, rivers, and lakes; but most of all is absorbed by the winds in passing over the oceans, such as the Atlantic Ocean. Such winds are saturated, or nearly so; that is, they carry away as much vapour as they can dissolve at the temperature they had while passing over the water. If this is higher than that of the land at which they first arrive, they will give up, as Rain, the vapour that no longer can be dissolved when the temperature falls. Hence, countries near oceans receive more Rain than those at a distance from them in the middle of continents. Mountainous countries near the sea are especially rainy, since air becomes colder the higher it rises along the slopes, and a very great part of the vapour is thus lost. For the reasons just stated, as well as from local peculiarities of situation, the frequency and amount of the rainfall varies widely in different localities, and at different seasons. The total amount of Rain that falls in any given time is measured by means of instruments (*see* **Rain-gauge**). Careful observations have been carried on in many countries, and in many localities, for a considerable number of years, as to the total amount of Rain that falls during the year, as well as during the various periods of the year, in each locality. The amount is expressed in the number of inches in depth that the Rain would reach in any given time, if it could all be confined to the exact area on which it has fallen.

It has been found that, in some countries in the tropics, *e.g.*, in Upper Egypt and the Sahara Desert, and on part of the coast of Peru, little Rain, if any, falls. On the other hand, the heaviest recorded rainfall occurs among mountain ranges in the neighbourhood of tropical oceans. Thus, in the Himalaya Mountains, about 100 miles from Calcutta, a rainfall of about 524in., or about 44ft., has been observed within a year. In the British Islands, the rainfall is considerably greater on the west side than on the east, the winds from the Atlantic Ocean losing much of their vapour among the mountains. The heaviest rainfall in Britain is recorded from the Cumberland mountains, near Keswick, where over 150in., or 12½ft., of Rain has been collected in a year. Along our western coasts, the average annual rainfall varies from about 36in. to 66in., and on the eastern side of our islands, from about 20in. to 30in.

But the actual rainfall does not bear any definite relation to the number of rainy days in a year, for often the heaviest fall is met with in districts where it is almost limited to certain seasons. When much Rain falls in a limited time, the greater part of it necessarily flows off the surface of the ground, and it is apt to carry away the fertile soil, and to cause disastrous floods. Where, on the other hand, the period during which it falls is more prolonged, the Rain sinks into the soil, and supplies the underground reservoirs of springs.

In passing through the atmosphere, the rain becomes of the same temperature, and, as this in summer is almost always higher than that of the soil, the latter becomes warmed, and the plants in it are stimulated to more active growth. Moreover, the rain-water has oxygen, and, it may be, also minute traces of ammonia and of nitric acid, obtained from the atmosphere, dissolved freely in it, and these also are beneficial, as food, to the roots of plants. It is unnecessary to dilate on the importance of a good supply of water in the soil, insured to plants by regular Rains.

Rain-water is very generally preferred for watering plants in pots, and it has the great advantage over

Rain—*continued.*

that drawn from springs, or from underground pipes, of usually being at the temperature of the air, and of containing in it the oxygen, and other substances, mentioned above. Its use is of course similar, in its effects, to the watering of plants by Rain in the open air and, when rain-water can be had, the employment of it is therefore to be recommended.

RAIN BERRY. *See* **Rhamnus catharticus.**

RAINBOW FLOWER. A common name for the genus *Iris.*

RAIN-GAUGE. This is an instrument for measuring the amount of rain that falls in any place in any given time. Various forms are used, but all are much alike in essential points. In all there must be a collecting surface of known size. This is generally a brass funnel, with an upright rim about 1½in. high around it, to prevent the drops from splashing over the edge. The rain-water runs down a tube into a receiver, which is protected from any water getting into it, except by the tube, and prevents the water in it from evaporating. At certain hours, the amount of water in the receiver is poured into a graduated vessel, and is carefully measured. Each mark on the measure represents, usually, $\frac{1}{100}$in. of rainfall. The receiver is generally made to hold 3in. depth of rainfall. The collecting funnel may be of any size, so long as accurately known; but 5in. is the common diameter. The funnel must be placed absolutely horizontal, and should stand in the middle of an open piece of ground, in order to avoid eddies. The rim should be at least 6in. above the surface on which it stands; but it ought not to be raised much, as, other conditions remaining the same, the higher the gauge stands, the less rain it catches. Snow must be melted, and measured as water, in calculating the total annual rainfall. Very slight showers cannot be measured, as the rain-drops evaporate from the funnel without running into the receiver; hence, the record may be rather low, if such showers are frequent.

RAISIN-TREE, JAPANESE. A common name for *Hovenia dulcis.*

RAJANIA. A synonym of **Akebia** (which *see*).

RAKES. These are indispensable in gardens, for levelling ground previous to seed-sowing, for collecting weeds, grass, leaves, &c., and for various other purposes. There are different sorts: some have the heads made of iron, others have wooden heads, into which iron teeth are driven, and others are made solely of wood, the same as used for hay-making. What is known as a set of iron Rakes should be at command in gardens of extent—that is, sizes with heads varying in length; as, for instance, one should be 6in., another 8in., and so on. A very useful size, for collecting weeds, levelling

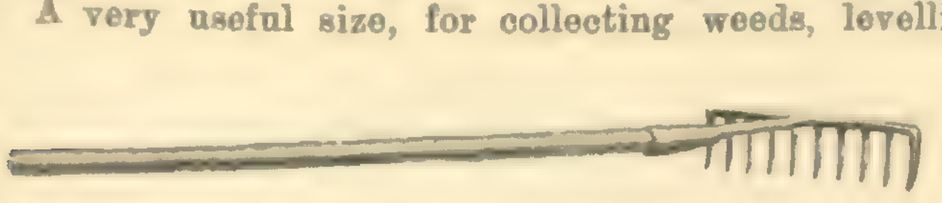

FIG. 349. IRON RAKE.

seed-beds, &c., is represented in Fig. 349. Wooden Rakes, of the ordinary make, are best adapted for raking over uncropped ground, for levelling gravel in walks, and for collecting grass and leaves from lawns; one or more of these may, therefore, be kept almost in constant use. Rakes with wooden handle and bar and iron teeth, are suitable for breaking up lumps of soil, where wooden teeth would soon become mutilated. Daisy Rakes have broad teeth, sharpened on both edges; they are used for removing Daisy flowers, &c., from lawns.

RAMAL, RAMEAL. Of, or belonging to, a branch.

RAMENTA. Thin, chaffy scales, with which the stems of some plants, especially Ferns, are covered.

RAMENTACEOUS. Covered with ramenta.

RAMIFICATION. Sub-divisions of root, branches, leaves, or panicles.

RAMIFLOROUS. Flowering on the branches.

RAMMERS. Rammers are in frequent requisition in gardens, more particularly through the autumn and winter, when transplanting and various alterations are in progress. They are required for consolidating the earth about newly-transplanted trees, also round posts, &c. In the formation of new walks, and when laying turf, a Rammer is necessary for rendering the ground beneath firm and solid. A handy form of Rammer is that having a cast-iron head, with a socket for inserting a wooden handle. Those generally seen are made of wood, tapering from a circular base upwards, and provided with handles for lifting. Hand Rammers may readily be made from any hard piece of prepared wood, such as an old spade-handle. They are indispensable when potting plants that require the soil to be very firm round their roots.

RAMONDIA (named in honour of L. F. Ramond, a French botanist and traveller, who died in 1827). SYNS. *Chaixia, Myconia.* ORD. *Gesneraceæ.* A genus comprising three species of hardy, stemless herbs; one is a native of South Europe, the second is Siberian, and the third is an inhabitant of Greece, &c. Calyx free, with four, five, or rarely six ovate or oblong segments; corolla violet or pale purplish, with a rotate or broadly campanulate tube, and four, five, or rarely six broad, imbricating lobes; stamens affixed to the base of the corolla; scapes leafless, one or few-flowered. Leaves radical, softly rugose. Only two species are in cultivation. *R. pyrenaica* is a very pretty little alpine plant, admirably adapted for cultivating in fissures of rockwork, or for pot culture in cold frames. It thrives in well-drained peaty soil, and may be increased by seeds, or by division. *R. serbica* requires similar treatment.

R. pyrenaica (Pyrenean).* Rosette Mullein. *fl.* purple; calyx and corolla five-parted, the latter with sub-obovate lobes; scapes many, several, or rarely one-flowered. May. *l.* rosulate, ovate, deeply toothed, hirsute with long, rufous hairs. *h.* 3in. Pyrenees, &c., 1731. (B. C. 703.) SYN. *Verbascum Myconi* (B. M. 490). There is a white-flowered variety of this in cultivation, but it is yet very rare in gardens.

R. serbica (Servian). *fl.*, corolla yellow, campanulate, parted to the middle in four obovate, sub-equal segments; scape one or two-flowered, ebracteate. *l.* rather thick, ovate, entire, obtuse, shortly attenuated at base, white-silky above, ferruginously woolly beneath, 1in. long. Thessaly. SYN. *Jankæa Heldreichii.*

RAMOSE. Branched or branching.

FIG. 350. RAMPION.

RAMPION (*Campanula Rapunculus*). A hardy biennial, cultivated for the use of its fleshy roots in salads, either boiled or in a raw state, generally the latter; the leaves are also used in winter salads. It

Rampion—*continued.*

is raised from seeds, which are very minute, and should be sown in very shallow drills, 6in. apart, not earlier than about the end of May, lest the plants run to seed before winter. Rampion is not extensively cultivated. It prefers a rather shady situation, and rich, light soil. The seeds should only be covered very slightly. Frequent waterings are necessary until the plants are established. When they are large enough to handle, thin out to 4in. apart. The roots, which are fleshy and white, will be fit for use from November through winter; they require scraping before being eaten. See Fig. 350.

RAMPION, HORNED. *See* **Phyteuma.**

RAM'S FOOT. An old name for *Ranunculus aquatilus.*

RAM'S HEAD. A common name for *Cypripedium arietinum.*

RAM'S HORNS. A common name for *Orchis mascula.*

RAMSONS. *See* **Allium ursinum.**

RAMULARIA. A group of Fungi, parasitic on various parts of living plants. The species are numerous; but almost all of them cause brown or pale spots on the leaves or other green organs, and their effect is thus conspicuous, though very seldom so hurtful as to cause serious injury to the plants. The mycelium is inside the host-plant; and from it, at each stoma, are pushed out several erect branches (conidiophores), which, at the tip, or near it, bear conidia, or spores. These are nearly cylindrical, but taper at both ends, and are divided by two or more cross-walls into several cells. It is probable that the Fungi grouped under *Ramularia* belong to the reproduction of **Pyrenomycetes** (which *see*). To enumerate the species that affect cultivated plants is unnecessary, since probably few flowering plants are quite free from the attacks of some Fungus of the group to which *Ramularia* belongs. No known remedy is so effectual as burning the more diseased plants or leaves. Fortunately, these Fungi seldom commit very serious depredations on cultivated plants.

RAMULOSE. Bearing many branchlets or twigs.

RANARIA. A synonym of *Herpestis.*

RANCAGUA. A synonym of **Lasthenia** (which *see*).

RANDALIA. A synonym of *Eriocaulon.*

RANDIA (named in honour of Isaac Rand, formerly Præfectus of the Botanic Garden of the Society of Apothecaries at Chelsea). SYNS. *Cupia, Oxyceros, Stylocoryne.* ORD. *Rubiaceæ.* A genus comprising about ninety species of erect or climbing, unarmed or spiny, stove, evergreen trees or shrubs, allied to *Gardenia*, inhabiting tropical regions, mostly in Asia and Africa. Flowers white or yellow, rarely pink, small or large, solitary, corymbose or fascicled, axillary, very rarely terminal; calyx tube ovoid, obovoid, or turbinate, the limb usually tubular, rarely toothed or lobed; corolla funnel-shaped, campanulate, or hypocrateriform, with a short or elongated tube, a glabrous or villous throat, and a limb of five (rarely more) acute or obtuse, twisted lobes; stamens five. Leaves obovate, oblong, or lanceolate, usually coriaceous. A selection of the introduced species is here given; they are shrubs, except where otherwise indicated. For culture, *see* **Gardenia.**

R. aculeata (prickly). Indigo Berry. *fl.* white, axillary, sessile, solitary, hypocrateriform; corolla tube twice as long as the calyx teeth. July. *fr.* the size of a small cherry. *l.* obovate, highly glabrous, sub-sessile, cuneate at base. Branchlets glabrous; spines rigid, opposite the axils, spreading. *h.* 12ft. West Indies, 1733. SYN. *Gardenia Randia* (B. M. 1841).

R. dumetorum (bushy). *fl.* white, at length yellow; calyx tube longer than the lanceolate corolla lobes; corolla silky outside. July. *fr.* large, ovate-cordate, shining. *l.* opposite or fasciculate, obovate-cuneate, smooth. *h.* 5ft. East Indies, 1825. A much-branched shrub or small tree, with axillary, rigid spines. SYN. *R. floribunda.*

R. fasciculata (fascicled). *fl.* white, sweet-scented, at length yellowish; fascicles sub-sessile. July. *l.* ovate-oblong, sub-sessile, smooth. *h.* 4ft. East Indies, 1824. A much-branched shrub, with axillary, spreading spines.

R. floribunda (bundle-flowered). A synonym of *R. dumetorum.*

R. horrida (horrid). *fl.* white, in trichotomous, sub-terminal racemes. May. *fr.* black. *l.* ovate-lanceolate, glabrous. Branches reclinate; branchlets decussate; spines large, opposite, horn-like. *h.* 5ft. Cochin China, 1825.

R. macrantha (large-flowered).* *fl.* pale yellow, axillary or terminal on the ultimate branchlets, solitary; calyx lobes somewhat leaf-like; corolla tube very long. June. *l.* obovate-oblong, acuminate, shortly petiolate, membranous, obsoletely pubescent beneath and on the veins. *h.* 9ft. to 30ft. Brazil, 1815. Unarmed climbing shrub or small tree. (B. M. 3809, under name of *R. Bowieana*; B. R. 1846, 63, under name of *Gardenia Devoniana.*)

R. maculata (spotted).* *fl.* white; corolla almost glabrous or scarcely puberulous, with a very long tube. April. *l.* subcoriaceous, shining, highly glabrous, oblong, very shortly petiolate. Sierra Leone, 1843. A small, unarmed, highly glabrous tree. (B. M. 4185, under name of *Gardenia Stanleyana.*)

R. malleifera (hammer-bearing). *fl.* white, solitary, terminal, tomentose; corolla tube cylindrical, club-shaped, expanded into a broad, funnel-shaped limb. July. *l.* ternate, obovate, cuspidate, cuneate at base, shortly petiolate, highly glabrous. *h.* 4ft. to 6ft. Sierra Leone, 1843. SYNS. *Gardenia malleifera* (B. M. 4307), *G. Whitefieldii.*

R. rotundifolia (round-leaved). *fl.* white, solitary, sessile; corolla twice as long as the calyx. July. *fr.* yellowish. *l.* subrotundate or ovate, pubescent on both sides, wrinkled. Branches and spines sub-verticillate. *h.* 6ft. Peru, 1820.

RANUNCULACEÆ. A natural order of herbs, rarely shrubs or woody climbers, dispersed over nearly the whole of the globe. Flowers regular or rarely irregular, hermaphrodite or by abortion dicœcious; inflorescence usually terminal, racemose or paniculate; sepals three to many, usually five, hypogynous, free, commonly petaloid and deciduous, imbricated or valvate; petals as many as the sepals, or numerous, sometimes flat and conspicuous, sometimes small, deformed, or even absent, imbricated; stamens usually numerous and many-seriate, hypogynous, free; anther connectives continuous with the filaments; carpels many or rarely solitary, free or rarely sub-connate. Fruit of pointed or feathery achenes, or of follicles, which are rarely united into a capsule. Leaves radical or alternate (in *Clematideæ* opposite) entire or palmately or sub-pinnately dissected; petioles often dilated, amplexicaul or rarely furnished with stipuliform appendages. Most of the *Ranunculaceæ* possess acrid, and more or less poisonous, but nevertheless volatile, properties. The juice of the leaves of *Clematis Vitalba* is employed by beggars for producing artificial sores. Several species of *Helleborus* possess purgative and poisonous properties. The narcotic and poisonous characters of the Aconites are well-known. The order comprises thirty genera, and upwards of 1200 species have been described, many of which are highly ornamental garden plants. Examples: *Aconitum, Anemone, Clematis, Delphinium, Pæonia,* and *Ranunculus.*

RANUNCULUS (a Latin name for a little frog applied by Pliny to these plants, the aquatic species growing where frogs abound). Buttercup; Crowfoot. Including *Ceratocephalus* and *Ficaria.* ORD. *Ranunculaceæ.* A large genus (about 160 species) of mostly hardy annual herbs (or at length often having perennial stems), dispersed over the whole globe, but most copious in temperate and frigid regions, particularly in the Northern hemisphere; within the tropics, a few only are found, and these on the tops of mountains. Flowers white, yellow, or red, terminal, solitary or paniculate, rarely sessile in the axils of the branchlets; sepals three to five, caducous; petals equal in number, or more (sometimes as many as fifteen), with a nectar-bearing scale at the base, conspicuous or rarely minute; stamens

Ranunculus—*continued.*

shorter than the sepals and petals, often numerous, very few in some few-flowered species; achenes compressed or sub-globose, smooth or variously striated, ribbed, wrinkled, or bristly. Leaves entire or dissected; those at the divisions of the stem often small. According to Hooker, sixteen species are included in the British Flora; some of these, although common weeds, are pretty objects when in flower, and hence are described below. Except where otherwise stated, all the species here mentioned are hardy. Nearly all are of easy culture in mixed borders, or in rock gardens; they usually prefer rather moist situations and loamy soil. *R. asiaticus* has long been in cultivation. This species and its numerous varieties require special and very different treatment from any of the others, but whenever the plants succeed and flower, their beauty will be sure to compensate for any extra attention bestowed. Propagation is effected by seeds, and by division.

For the varieties of the garden Ranunculus (*R. asiaticus*) special beds should be prepared by taking out the ordinary soil to a depth of about 1½ft. to 2ft., placing some drainage in the bottom, if there is a suspicion of stagnant moisture, and filling up with a prepared compost. This should consist of two parts loam to one of leaf soil and thoroughly decayed cowdung. Plenty of sharp, river or road sand should be intermixed, the compost prepared, and the beds made up some time, if possible, before planting time. The safest time to plant is towards the end of February, should weather permit; autumn planting is sometimes practised, but it is unsafe, because of the roots being liable to perish through winter. The soil must be rendered fine on the surface, and raised a little above the edges. The roots, which are small and some-

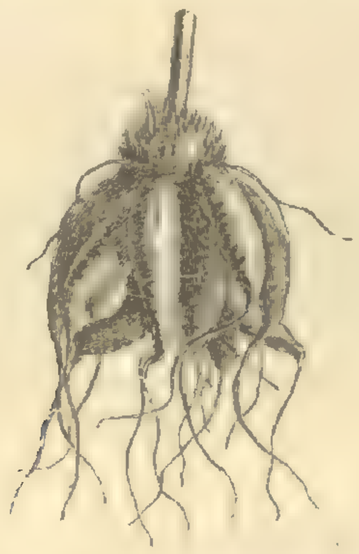

FIG. 351. ROOT OF GARDEN RANUNCULUS.

what like small claws (see Fig. 351), may be inserted about 6in. apart, and all placed at an equal depth of 1½in. or 2in. The claws must be set downwards, and pressed firmly in place; afterwards, a little sand should be scattered in, and then covered with fine prepared soil. When the flowers begin to expand, it is advisable, if convenient, to place a light awning over them, to afford shade and shelter; but this is not absolutely necessary. Should the weather be dry, water must be supplied in sufficient quantity to prevent the soil cracking; it should be given at intervals in the evening. The Ranunculus likes plenty of moisture, but over-abundant supplies generally cause the leaves to turn yellow and die off prematurely; a top-dressing of leaf mould or cocoa-nut fibre is of great service in retaining moisture. So soon as the leaves ripen and turn yellow, after flowering is over, the tubers should be lifted and stored away in a dry, airy compartment, in drawers, or suspended in paper bags, until planting time again arrives. This lifting of the roots at the proper time is a most important part of the management. There are two principal sections of the garden Ranunculus; one is known as the Persian, and the other the Turban. Varieties of the first-named are very compact and symmetrical in habit, and all their flowers are

Ranunculus—*continued.*

very beautiful. The Turban forms are somewhat coarser in growth, but are of hardier constitution than the Persian. There are not so many varieties of these, but they are well adapted for massing in beds and borders. Collections of varieties are usually selected and sent out by nurserymen and bulb merchants; it is, therefore, unnecessary to enumerate descriptions.

FIG. 352. RANUNCULUS ACONITIFOLIUS FLORE-PLENO, showing Habit and detached Single Flower.

R. aconitifolius (Aconite-leaved).* *fl.* white, few or numerous; calyx pressed, smooth; petals oblong, cuneated, or orbicular. May and June. *l.* palmately three to five-parted, with the partitions deeply toothed; upper leaves sessile, cleft into linear-lanceolate lobes. Stem branched. *h.* 6in. to 2ft. Europe, 1596. The flowers of varieties of this species are known in gardens by the name of White Bachelors' Buttons. The double-flowered form is the most ornamental, and is generally known in gardens under the names of Fair Maids of France and Fair Maids of Kent. See Fig. 352. (B. M. 204.)

FIG. 353. RANUNCULUS AMPLEXICAULIS.

R. acris (sharp). Common Buttercup; Gold Knots. *fl.* yellow, 1in. in diameter; sepals and petals spreading, the former pubescent; peduncles not furrowed. April to September. *l.* usually all petiolate, orbicular or five-angled in outline, three to seven-parted, the uppermost ones sessile; segments of lower leaves cuneate, deeply cut and lobed, those of the upper ones

Ranunculus—*continued.*

linear and entire. Stem erect. Rootstock straight. *h.* 8in. to 3ft. Europe (Britain), North Asia. Plant hairy. (Sy. En. B. 33.) A double-flowered form of this species—Yellow Bachelors' Buttons—is figured in B. M. 215.

R. alpestris (alpine). *fl.* white, varying in size, either single or double, usually one to a stem; petals five, obcordate or three-lobed. June to August. *l.* orbicular-cordate, three-lobed, with the tops deeply crenate at the apex, blunt; sometimes the leaves are trifid, or hardly so. *h.* 3in. to 6in. Pyrenees, &c.

R. amplexicaulis (stem-clasping).* *fl.* snowy-white under cultivation, seldom double; scapes and peduncles smooth. April and May. *l.* oval-lanceolate, acuminate, stem-clasping, smooth, or with a few deciduous hairs on the edges, glaucous. Stems three to six-flowered. *h.* 3in. to 9in. Pyrenees and Western Alps, 1633. See Fig. 353. (B. M. 266; G. C. n. s., xix. 788; R. G. 1885, 244.)

R. anemonoides (Anemone-like).* *fl.* white, tinted with pink, pale outside, large, and rather attractive, borne on peduncles 3in. to 6in. high. Summer. *l.* glaucous-green, biternately divided, the segments cut into linear divisions. Styrian Alps, &c., 1883. A charming little plant.

R. aquatilis (aquatic). Lodewort; Ram's Foot, &c. *fl.* white; peduncles usually leaf-opposed, one-flowered. May to August. *l.*, floating ones three-lobed, or parted or absent; submerged ones di- or trichotomously multifid, the segments capillary or linear; stipules broad. Temperate regions (Britain). A very variable plant, of which the following are enumerated, by Hooker, as sub-species: *circinatus*, *fluitans*, *heterophyllus*, *pantothrix*, and *tripartitus*.

FIG. 354. RANUNCULUS ASIATICUS FLORE-PLENO.

R. asiaticus (Asiatic).* Common Garden Ranunculus. *fl.* variable in colour; calyx spreading, afterwards reflexed; petals large, obovate, very blunt. May and June. *l.* ternate or biternate; segments toothed or deeply trifid. Stem erect, simple or branched at the base. *h.* 9in. Levant, 1596. Under cultivation, this has nearly always double flowers. See Fig. 354.

R. a. sanguineus (bloody).* Turkey Ranunculus. *fl.* purple, yellow, orange, and variegated with the same colours, excluding all colours verging on white or blue, always double. *l.* ternate; segments toothed, obtuse. Stem simple.

R. a. tenuilobus (slender-lobed). *fl.* white, yellow, rarely purple. *l.* multifid, with linear, acute lobes. Stem somewhat branched.

R. a. vulgaris (common). Persian Ranunculus. *fl.* of all colours (blue excepted), and variegated, double or single. *l.* ternate; segments trifid, acute. Stem branched at the bottom. A very ornamental plant, having innumerable forms in gardens.

Ranunculus—*continued.*

R. bulbosus (bulbous-rooted). Cuckoo Buds; Gold Cup. *fl.* yellow, with furrowed peduncles, reflexed sepals, and hairy receptacle. Spring and early summer. *l.* trifoliolate or ternatisect, hairy; segments lobed. *h.* 1ft. Europe, Asia, North Africa. (Sy. En. B. 35.)

R. cardiophyllus (heart-leaved). *fl.* golden, large; calyx spreading, half as long as the corolla. May. *l.*, radical ones roundish-cordate, crenate and multifid; cauline ones palmately multifid; lobes linear, deeply crenate. *h.* 1ft. North America, 1829. Plant pubescent, hairy. (B. M. 2999.)

R. cassubicus (Cassubian). *fl.* yellow; calyx pubescent, shorter than the petals. June and July. *l.* smooth; radical ones stalked, kidney-shaped, crenate; cauline ones divided into linear, serrated lobes. *h.* 6in. Northern and Eastern Europe, &c., 1794. (B. M. 2267.)

R. cortusæfolius (Cortusa-leaved).* *fl.* yellow; calyx spreading. May. *l.*, as well as the stem, slightly pilose; radical ones somewhat cordate-reniform, slightly lobed, broadly crenate; cauline ones sub-sessile, three to five-parted; floral ones lanceolate. Stem branched, corymbose. *h.* 2ft. Teneriffe, 1826. (B. M. 4625; L. J. F. iii. 293.)

R. creticus macrophyllus (large-leaved Cretan). *fl.* golden, large; calyx pressed. April and May. *l.* profoundly lobed, with slightly rounded teeth. Stem branched, many-flowered, and, as well as the leaves, slightly hairy. *h.* 1ft. Grecian Archipelago, 1658. (B. R. 1432.)

R. Ficaria (Figwort). Lesser Celandine; Pilewort. *fl.* bright yellow, about 1in. in diameter, sometimes apetalous; peduncles stout, axillary, one-flowered. March to May. *l.* variable, cordate, obtusely angled or crenate; petioles stout, dilated at base. Stem short, decumbent, branched at base. Europe (Britain, &c.). See Fig. 355. (Sy. En. B. 39.)

R. Flammula (Flammula). Lesser Spearwort. *fl.* yellow, rarely ¾in. in diameter; style of achenes short, obtuse. June to August. *l.*, lowest ones petiolate, ovate; upper ones more lanceolate and sessile. Europe (Britain). Plant prostrate or erect. (F. D. 572; Sy. En. B. 29.)

R. fumariæfolius (Fumitory-leaved). *fl.* yellow, always double; sepals ovate-oblong, spreading; scapes numerous, one-flowered, leafless or furnished with one multifid leaf about the middle, clothed with adpressed hairs. May to July. *l.* quite smooth, pinnate, many-parted; lobes oblong. *h.* 1ft. Native country unknown.

R. glacialis (glacier). *fl.* seldom double; petals white or reddish, suffused with purple, somewhat orbicular, bluntly emarginate, as long as the very hairy calyx. June to August. *l.* usually smooth, or the upper ones sometimes villous; radical ones stalked palmately three-parted or ternate, with trifid lobes and rather blunt lobules. Stem one to three-flowered. *h.* 3in. to 6in. Mountains of Europe, 1775. (F. D. i. 19.)

R. gramineus (grass-like).* *fl.* yellow; scales of petals tubular April to June. *l.* lanceolate-linear, quite entire. Stems erect, quite smooth, with fibres at the neck, one to three-flowered. *h.* 6in. to 12in. South-western Europe, &c. (B. M. 164.) The variety *flore-pleno* has double flowers, and *phœnicifolius* has lanceolate leaves.

R. Heldreichianus (Heldreich's). *fl.* of a pale chrome-yellow, shining, numerous. Spring. *l.* tripartite, the lobes deeply incised. *h.* 1ft. Greece, 1882. An attractive plant, a sub-species of *R. Sprunerianus*.

R. isopyroides (Isopyrum-like). *fl.* white; petals five or sometimes more, twice as long as the smooth calyx, oval; peduncles two or three, rising from the axils of the upper leaves, or terminal. May and June. *l.*, radical ones pinnate, with stalked, twice trifid segments; cauline ones ternate. *h.* 3in. to 6in. Siberia, 1818.

R. Lingua (Lingua). Greater Spearwort. *fl.* yellow, handsome, 2in. in diameter, sub-ranicled; sepals and petals five. July to September. *l.* 6in. to 10in. long, ¾in. to 1in. broad, sessile, half-amplexicaul, lanceolate, entire or toothed. Stem 2ft. to 3ft. high, hollow. Root densely fibrous. Europe (Britain, in marshes and ditches). (Sy. En. B. 31.)

R. Lyalli (Lyall's).* New Zealand Water Lily. *fl.* waxy-white, 4in. in diameter; sepals five, broad, pilose; petals broadly cuneate, with an obscure, oblong, basilar gland; peduncles very numerous, stout, erect. Spring and summer. *l.* peltate, on long, stout petioles, glabrous; limb orbicular, very concave, thick and coriaceous, sometimes 1½ft. in diameter, simply crenate. Stem paniculately branched, many-flowered. *h.* 2ft. to 4ft. New Zealand, 1879. A very handsome, erect, cool greenhouse plant. (G. C. n. s., xv. 724, and xxiii. 371.)

R. millefoliatus (thousand-leaved). *fl.* yellow; calyx pressed. May to July. *l.* decompound, multifid; lobes linear, smooth. Stem almost leafless, erect, villous, one-flowered. *h.* 1ft. South Europe, 1820. (B. M. 3009.) *grandiflorus* (S. B. F. G. ser. ii. 248) is a form with larger flowers.

R. monspeliacus (Montpelier). *fl.* yellow; calyx reflexed. April and May. *l.* woolly; radical ones three-lobed; lobes cuneate, trifidly toothed; upper leaves three-parted, with entire, linear lobes. Stem erect, few-flowered. *h.* 1½ft. Mediterranean region.

Ranunculus—*continued.*

R. m. cuneatus (wedge-shaped). *l.*, lobes wedge-shaped, trifidly toothed at the top. (S. B. F. G. ser. i. 94.)

R. m. rotundifolius (round-leaved). *l.* roundish, trifid; lobes toothed, obtuse.

R. montanus (mountain). *fl.* yellow, a little larger than those of *R. acris*; calyx smoothish; stigmas beautifully revolute. May to July. *l.*, radical ones smooth, three-parted, orbicular, with trifid, blunt segments; cauline ones sessile, three to five-parted into linear, quite entire lobes. Stem one-flowered, clothed with pressed pubescence at the top. *h.* 6in. Europe, &c., 1775. (B. M. 3022; J. F. A. 325, 326, under name of *R. nivalis*.)

R. parnassifolius (Parnassia-leaved).* *fl.* snowy-white or sometimes purplish, about the size of those of *R. amplexicaulis*; peduncles hairy. June and July. *l.*, radical ones stalked, rather heart-shaped, ovate-roundish; cauline ones sessile, ovate-lanceolate; footstalks much dilated at their base. Stem one to six-flowered. *h.* 3in. to 6in. Alps and Pyrenees, 1769. See Fig. 356. (B. M. 386.)

FIG. 355. RANUNCULUS FICARIA.

R. pedatus (pedate-leaved). *fl.* yellow; calyx appressed. May and June. *l.* smooth; radical ones stalked, three-parted or pedate; lobes linear, entire or bifid; cauline leaves sessile, parted; uppermost ones linear. Stem erect, one to five-flowered. *h.* 1ft. Eastern Europe, 1806. (B. M. 2229.)

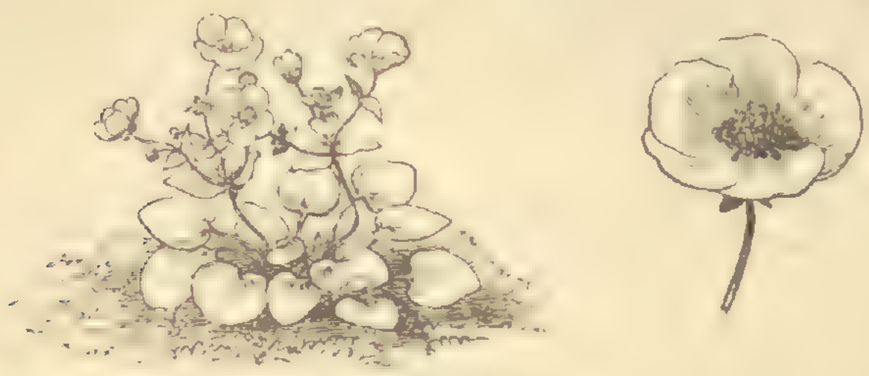

FIG. 356. RANUNCULUS PARNASSIFOLIUS, showing Habit and detached Single Flower.

R. repens (creeping). *fl.* yellow, 1in. in diameter; sepals spreading, hairy; petals generally sub-erect; peduncles furrowed. May to August. *l.* petioled, triangular or ovate, trifoliolate or ternately pinnatisect; segments variable, the middle one usually largest. Stem decumbent below, 8in. to 2ft. long, with long runners. Rootstock stout, short. Europe (Britain), Asia, &c. This is often a very troublesome weed. (Sy. En. B. 34.) *flore-pleno* is a double-flowered garden variety.

R. rutæfolius (Rue-leaved). *fl.* yellow; petals eight to ten, oblong, with an orange claw. May to July. *l.* pinnate, with three-lobed, multifid lobes. Stem generally one, rarely two or three-flowered. *h.* 3in. to 6in. Higher Alps (among rocks, near the limits of perpetual snow), 1759.

Ranunculus—*continued.*

R. spicatus (spike-flowered). *fl.* bright yellow, large, one to three to a stem. Spring. *l.* cordate-reniform or cordate-elliptic in outline, somewhat three-lobed, irregularly toothed. *h.* 1ft. Algeria, 1881. An ornamental plant, dying down early in summer, and appearing again in September and October. (B. M. 4585; F. d. S. 666; G. C. n. s., xv. 693.)

RAPANEA. A synonym of **Myrsine** (which *see*).

RAPATEACEÆ. A small natural order of perennial, usually tall, marsh, monocotyledonous herbs with short, thick rhizomes; they are found in Brazil or Guiana, extending a little way into Venezuela. Flowers hermaphrodite, regular, generally in dense, terminal heads, sessile or pedicellate, with many imbricate bracts; perianth inferior, six-parted, three outer leaflets calycine, three inner petaloid; stamens six, erect; ovary superior, sessile, included in the corolla tube; scapes erect. Capsules membranous or coriaceous, sessile. Leaves radical, broadly linear-lanceolate or oblong, often long, acuminate, petiolate or sessile in a sheath. The order comprises six genera, and about a score species, none of which are of much use or very ornamental. Examples: *Rapatea*, *Saxofridericia*, and *Spatanthus*.

RAPATEA PANDANOIDES. A synonym of **Saxofridericia regalis** (which *see*).

RAPE (*Brassica Napus*, a sub-species of *B. campestris*). A British, hardy biennial, sometimes grown in gardens, in a similar way to Mustard and Cress, for forming a small salad.

RAPE, BROOM. *See* **Orobanche.**

RAPHANISTRUM. Included under **Raphanus** (which *see*).

RAPHANUS (the old Greek name used by Theophrastus, connected with the Latin *rapum*). Including *Raphanistrum*. ORD. *Cruciferæ*. A genus comprising about half-a-dozen species of hardy, annual or biennial, branched herbs, natives of Europe and temperate Asia. Flowers white or yellow, purple-veined, slenderly pedicellate; sepals erect, lateral ones sub-saccate at base; racemes elongated, terminal and opposite the leaves, ebracteate. Pods elongated, erecto-patent. Lower

Raphanus—*continued.*

leaves lyrate. Root often succulent. *R. caudatus* furnishes long, edible pods. For culture and general remarks, *see* **Radish.**

R. caudatus (tailed). *fl.* purplish and veined, the size of those of the common Wallflower. May to August. Pods depressed, acuminated, longer than the whole plant. Stems purplish, with a glaucous hue, at first erect, then prostrate. Commonly cultivated in Western India, said to be a native of Java, 1815. Annual. (R. G. 594.)

R. sativus (cultivated). Common Garden Radish. *fl.* varying from white to pale violet, with strong, dark-coloured veins, moderate-sized, borne on a round, erect and branching stem, about 3ft. high. May. Seed-pods smooth, ending in a beak. *l.* rough, lyrate, or partly divided into transverse segments, the outer one largest and broadest. Root reddish-purple, white, yellowish, or deep brown, fusiform, semi-globular, or turnip-shaped. Annual. This is a native of temperate regions of the Old World, but, since remote historical times, it has been widely cultivated, and is now naturalised in many countries. Some botanists (Bentham, Hooker, and others) regard *R. sativus* as a form of *R. Raphanistrum.*

RAPHIA (from *raphis*, a needle; alluding to the beaked fruit). SYN. *Metroxylon* (of Sprengel). ORD. *Palmæ.* A genus comprising six or seven species of stove palms, unarmed or with armed sheaths; one is a native of America, from the mouth of the Amazon to Nicaragua, and the rest are found in tropical Africa and Madagascar. Flowers elongated, often decurved, long-exserted, on pectinate, compressed branchlets; common spathe none; partial ones numerous; spadices large, pendulous, cylindrical, densely much-branched, the branches imbricated, flabelliform, pectinate; bracts ladle-shaped, compressed, closely imbricated. Fruit large, oblong, ovoid, or ellipsoid, rostrate, one-valved, one-seeded, with ample scales, the spikes sometimes weighing from 200lb. to 300lb. Leaves terminal, long, sub-erect, equally pinnatisect; segments linear-lanceolate, acuminate, thickly coriaceous, recurved, bristly or slightly aculeate at base and on the margins; petioles cylindrical, or convex at back and flattened above; sheaths short, with long-fibrous margins. Trunk mediocre or tall, simple or dichotomously divided, densely annulate. Several of the species are grown in this country. For culture, *see* **Cocos.**

R. Ruffia. Raffia or Roffia Palm. *fr.* obovate or pyriform, mucronate, twelve (rarely thirteen to fifteen) sulcate; scales shining, deeply sulcate. *l.* 50ft. to 60ft. long. Caudex tall. Mascarene Islands.

R. tædigera (torch-bearing). Raffia or Roffia Palm. *fl.* greenish-olive, densely clustered; spadices very large, compoundly branched, and drooping. *fr.* 2½in. long, oblong, reticulated with large scales. *l.* 50ft. or more long, rising nearly vertically from the stem, and bending out on every side in graceful curves, forming a magnificent plume 70ft. high and 40ft. in diameter; leaflets spread out 4ft. on each side of the midrib, rather irregularly scattered, and not very closely set, drooping at the tips, and having weak spinules along the margins. Trunk generally 6ft. to 8ft. high, and about 1ft. in diameter, clothed for some distance down with the sheathing bases of the leafstalks. Amazon, 1847.

R. vinifera (wine-producing). Bamboo or Wine Palm. *fr.* linear-oblong, slightly acute, nine-sulcate; scales pale chestnut, slightly convex. *l.* 6ft. to 7ft. long; leaflets beset with spines. Sierra Leone. A middle-sized tree.

RAPHIDES, or **RHAPHIDES.** Crystals formed in the cells of plants, consisting of various salts. They are mostly needle-shaped—hence the name.

RAPHIDOPHORA. A synonym of **Rhaphidophora** (which *see*).

RAPHIOLEPIS. *See* **Rhaphiolepis.**

RAPHISTEMMA (from *raphis*, a needle, and *stemma*, a crown; in allusion to the needle-shaped segments of the corona). ORD. *Asclepiadeæ.* A genus consisting of only two species of stove, twining, glabrous shrubs or sub-shrubs, natives of the East Indies and the Malayan Archipelago. Flowers white, rather large, in umbelliform, long-pedunculate cymes; calyx deeply five-cut or parted; corolla sub-campanulate, with five twisted lobes; corona scales five, adnate at base in a staminal tube. Leaves opposite, membranous. The species introduced requires culture similar to **Stephanotis** (which *see*).

Raphistemma—*continued.*

R. ciliatum (ciliated). A synonym of *Dæmia extensa.*

R. pulchellum (pretty). *fl.*, corolla segments ovate, obtuse, erect; stigma rather prominent, umbilicate. July. *l.* cordate, acuminate, membranous, glabrous on both sides, glanduliferous. East Indies, 1852. Shrub. (F. d. S. 228; L. & P. F. G. 101; P. M. B. xiv. 27.)

RAPUNCULUS. A synonym of **Phyteuma** (which *see*).

RAPUNTIUM. A synonym of **Lobelia** (which *see*).

RASPAILIA. A synonym of *Polypogon.*

RASPALIA (named after F. V. Raspail, a celebrated French chemist and botanist, 1794-1878). ORD. *Bruniaceæ.* A genus comprising seven or eight species of small, greenhouse, Heath-like shrubs, with twiggy branches, confined to South Africa. Flowers white or yellow, small, disposed in small, globose or elongated, not involucrate, densely aggregate heads; calyx five-lobed; petals five, free, not keeled; bracts shorter than the flowers. Leaves dense, imbricated, appressed, thickly coriaceous, glabrous or velvety. *R. microphylla*, the only species calling for description, thrives in a compost of sandy peat. Propagated by cuttings of young, stubby shoots, inserted in sand, under a bell glass, in a cold frame.

R. microphylla (small-leaved). *fl.* white, minute; heads the size of a pea. July. *l.* half to one line long and wide, spirally inserted, the younger ones ciliolate. Branches short, woolly, a little spreading. *h.* 1ft. or more. 1804.

RASPBERRY (*Rubus Idæus*). The Raspberry is a native of most European countries, including Great Britain. It is a deciduous shrub, with a creeping, perennial rootstock, and a biennial stem. The fruit is extensively employed for cooking and preserving in various ways; it is also favoured for dessert, and largely used in the manufacture of Raspberry brandy, wine, vinegar, &c. When first ripened, it has a fine aroma, which is generally not retained longer than a day or two afterwards. Raspberry shoots, which are technically termed "canes," proceed annually from established plants, either from the rootstock or as suckers from the root. They grow through the summer, ripen and lose their leaves in autumn, and bear fruit the following season, on little branchlets, which are produced from the joints (see Fig. 357). In the following autumn, these canes die down, and their place, the next season, is occupied by others that will have been growing in succession. These remarks have reference to the summer-fruiting varieties; those which bear in autumn do so on the points of shoots made during the summer.

PROPAGATION. Raspberries are propagated from seeds, suckers, or offsets, and occasionally from cuttings. Seeds required for sowing should be saved from large, well-ripened fruits. They should be washed, to separate them from the pulp, and afterwards dried a little, yet not too much. If sown at once, in sandy soil, they will vegetate in the spring, be ready for transplanting the following autumn, and bear some fruit the second year. Propagation by suckers or offsets is the plan most generally adopted. These must be carefully detached from established plants, when they proceed from near the base; the root-suckers, which often spring up some distance away, may easily be transplanted. October and November are the best months for making new plantations, and for removing suckers; but the work may be performed, during fine weather, later on in winter. Cuttings are seldom inserted, unless for increasing any particular variety more rapidly than suckers alone admit.

Raspberry—*continued.*

CULTIVATION. Ground intended for a new Raspberry plantation should be well trenched, and have plenty of manure intermixed. A good depth of soil is essential, and a rather moist situation is preferable. When trenching, the subsoil need not be brought to the surface if it is of an inferior description, but it should be moved to a depth of from 2ft. to 2½ft., and have some decomposed manure mixed with it. The usual method of planting is in rows, about 5ft. apart, a distance of not less than 3ft. being allowed between plants in the row. Canes may be arranged singly, in twos, or in threes; when more than one are planted, a space of 6in. should be allowed between them. Two or three canes form a full-sized bush on a stake in a much shorter time than one; but, of course, many more are required, in the first instance, to form a plantation. After the canes are planted, they should be cut down to within 1ft. of the ground; this will encourage the production of stronger growths the next summer than could be expected if they were allowed to fruit the first year. The following autumn, the canes should be tied to stakes, and shortened to a height of about 6ft.; the plantation may then be considered established. In the second season, these canes will bear fruit from the side branchlets, and suckers will proceed from the base, to form others for fruiting the succeeding year; about six of the strongest will be sufficient to leave on each plant; the remainder should be removed early in the season as they appear. The pruning for this and successive seasons consists in cutting away the old canes any time after fruiting, and tying the new ones in the autumn to take their place. Raspberries are sometimes trained to a trellis formed horizontally with strained wire, or narrow strips of wood about 1in. thick, with upright stakes at intervals. The plants for training against these may be arranged about 2ft. asunder, and old and young canes should be trained alternately as far as convenient. Another method of training is that of arching, for which purpose plants may be inserted 4ft. apart, and the tops of one trained over to meet those of that adjoining.

A top-dressing of manure should be applied to Raspberry plantations in the autumn: it may be lightly forked in, but the soil should never be stirred to a great depth; otherwise, many of the surface-roots would be destroyed. When very large fruits are required, but few bearing shoots should be allowed, and these only of the strongest description. The young shoots from a few

FIG. 357. FRUITING BRANCHLET OF RASPBERRY.

Raspberry—*continued.*

stools might be kept removed, in order to throw additional support into those fruiting; this, however, would prevent the development of canes for bearing the succeeding year.

FUNGI. Though a good many Fungi grow on dead Raspberry canes, this plant does not experience serious damage from parasitic Fungi. The most common one is a Brand, belonging to *Phragmidium*, a genus of *Uredineæ*, characterised by having the more conspicuous spores (teleutospores) composed of a row of cells, end to end (*see* **Phragmidium**). The leaves of the Raspberry in autumn are often thickly sprinkled with small, black dots, made up of masses of spores of *P. Rubi-Idæi*, Pers. (*P. gracilis*, Grev.), or the Raspberry Brand. The spores are cylindrical, or nearly so, contain from six to ten cells, and end in a conical point. The dark masses are preceded by yellow spots, which are the æcidia, or the uredo form of this plant. These yellow spots are made up of spores, roundish or elliptical in form, yellow in colour, and prickly; but the æcidiospores are produced in rows, while the uredospores grow singly on the tips of short stalks, which are crowded together in separate spots.

The living leaves of Raspberries frequently have the upper side sprinkled thickly with black dots, smaller than those caused by *Phragmidium*. These are the perithecia of *Coleroa chætomium*, Kunze (*Stigmatea Chætomium*, Fries.), one of the *Pyrenomycetes*. With the microscope, it is seen that they lie on the surface of the leaf, and are bristly, globular, and thin. Each contains a number of asci, each of which incloses eight two-celled spores.

Both kinds of Fungi are apt to cause the premature discoloration and the fall of the leaves, but it can scarcely be said that they seriously affect the welfare of the plants. The only remedy is to pick off the speckled leaves, or to cut down and burn those plants that are seriously attacked; but this is seldom, if ever, necessary.

INSECTS. The roots are, in common with those of other plants, liable to be cut and eaten by **Mole Crickets**, and by the usual subterranean larvæ (*e.g.*, **Cockchafers**, &c.). Damage from this cause is so seldom serious that it need not be dwelt on. The young canes, and the fruit, on the contrary, are sometimes very much injured by certain insects. Among these, the following have been recorded in Miss Ormerod's valuable "Reports on Injurious Insects," for 1879 and 1883, as peculiarly destructive. Certain Weevils (*Otiorhynchus picipes, O. sulcatus*, &c.) gnaw the young shoots, killing them, and greatly weakening the plants, many of which perish when the attack is severe. Besides this, the beetles gnaw through the bases of the flower shoots, either cutting them off entirely, or biting half through them, causing them to wither, and destroying the crops. For a description of these insects, *see* **Otiorhynchus.** They hide, during the day, under any shelter they can reach, and, as they are wingless, this must be near the plants. Hence, pieces of bark, or similar objects, placed in their haunts, prove good traps, and have been used with success for their capture, since they are easily cleared off the lower surface of such traps. Any sticky substance smeared round the stems would prevent the ascent of the insects to the flower-shoots; but this method is too laborious to be employed for any but choice plants. The most effectual means of destroying the beetles has been found to be shaking the plants after dark over shallow wooden trays, smeared with tar round the sides, to prevent the escape of the insects,

Raspberry—*continued.*

which may then be killed by being thrown into boiling water. In certain districts in the south-west of England, and in France, the Raspberry crop has been injured to the value of hundreds of pounds in a season.

The larvæ of a small moth (*Lampronia rubiella*), the Raspberry-bud Caterpillars, have been found feeding in such numbers in tips of the young shoots, eating their way down the centre, from near the tip towards the base, that the plants were severely injured. These larvæ are bright red, with the head brown. They spin cocoons among dead leaves, in early summer; and, in two or three weeks, from them moths emerge about ½in. in spread of fore wings, which are brown, with gold spots. The larvæ emerge from the eggs in autumn, and feed on the leaves; but in spring they bore into the shoots. They probably hybernate in the soil around the plants; hence, this should be turned over, to expose them to birds, damp, and cold. When the young shoots droop at the tips, the larvæ should be looked for, and, if they are found, the diseased shoots ought to be removed and destroyed, with the larvæ in them.

A second Weevil (*Anthonomus Rubi*) may be called the Raspberry Weevil, inasmuch as it lives in the flower-buds of Raspberries and of Brambles. It is about ⅛in. long by $\frac{1}{24}$in. broad, black, with a fine, grey pubescence, and white scutellum; the wing-cases and the thorax are thickly pitted; the thighs are scarcely toothed. The colour varies so much as to have led to the forms being regarded as species, and named as such. The female bores a hole in each flower-bud, in early summer, and pushes in an egg. She usually gnaws half through the stalk of the bud, and the latter is apt to fall off. The larvæ feed on the parts of the flower-bud, and the beetles appear from the buds in July, and hybernate during winter. When they prove troublesome, they may be shaken off the plants, as recommended for the species of *Otiorhynchus*, and the infested buds may be picked off and destroyed. *See also* the remedies under **Apple-blossom Weevil.**

Another beetle is recorded in the Report for 1883 as "causing fearful havoc, and entirely devouring the Raspberries" in Kent. This is the Raspberry Beetle (*Byturus tomentosus*). The beetle is about $\frac{1}{6}$in. long by half as broad. It varies in colour from dull yellow or reddish to brown, and is densely covered with fine grey pubescence; the eyes are black, and the limbs are dull yellow or reddish-yellow. The female bores, like *Anthonomus rubi*, into the flower-buds; and the larvæ live in the fruits, which may ripen. The larvæ have six short legs, are rather flattened, and taper to each end. The head is pale brown; the body yellowish, darker on the back. The larvæ, when mature, leave the fruits, and shelter themselves in crevices, *e.g.*, in cracks of bark of the Raspberry canes, and there form their cocoons, and become pupæ. The beetles emerge in spring. The same remedies may be used against these insects as have been recommended against the other beetles on Raspberries. A very similar insect (*B. unicolor*) is found in the United States of America on Raspberries. The leaves of Raspberries are frequently mined by larvæ of various kinds, which produce in the leaves conspicuous pale winding tunnels. About the most hurtful of these leaf-mining larvæ are those of *Fenusa pumilio*, a small Sawfly, about $\frac{1}{7}$in. long, and black, with pale yellow legs, except at the joints, which are black. At times, the damage done by them materially affects the health of the plants. Almost the only remedy is to collect the diseased leaves and burn them, or to crush the larvæ in the leaves between the finger and thumb.

The larvæ of several larger species of Sawflies, and of Moths, feed exposed on the leaves. A Cynipid (*Diastrophus Rubi*) and a Midge (*Lasioptera Rubi*) cause woody galls on the stems, in the form of swellings, sometimes

Raspberry—*continued.*

2in. to 3in. long by ¼in. to 1in. thick, tapering upwards and downwards. Three or four kinds of Aphides feed on the leaves and other green parts of the bushes, but none of these are very hurtful. The gall-makers are easily kept in check by cutting off the galls while still young. The larvæ of the moths and Sawflies may be destroyed, if necessary, by applications of hellebore. The Aphides may be treated by any of the methods recommended under the heading **Aphides.**

SORTS. The following list comprises most of the best varieties in cultivation; it is unnecessary to grow all of them, but occasionally one succeeds better than another.

Baumforth's Seedling. Fruit large, dark crimson, of excellent flavour. Considered an improved form of NORTHUMBERLAND FILLBASKET. Good.

Belle de Fontenay. Fruit large, round, red. Leaves silvery underneath. An autumn-bearing variety, which ripens its fruit in October.

Carter's Prolific. Fruit large, deep red; flesh firm, and of good flavour. A very free-bearing summer variety.

Fastolf. Fruit very large, globular, bright red, of good flavour. A most abundant summer bearer; one of the best and most generally useful sorts.

Large-fruited Monthly. Fruit rather large, deep purplish-red, of excellent flavour. A productive autumnal variety.

McLaren's Prolific. Fruit roundish, large, of a deep crimson colour, produced in summer, and again on the young shoots during autumn.

Northumberland Fillbasket. Fruit large, deep red, of good flavour. The variety is a very vigorous-growing one, and an abundant summer bearer.

October Red and **October Yellow.** Varieties with respectively red and yellow fruits, produced from September to November in fine seasons, principally from the young canes.

Prince of Wales. Fruit very large, globular, deep crimson, of excellent flavour. Summer. The canes are light-coloured, and of unusual strength, but are not produced very freely.

Red Antwerp. Fruit large, conical, dull red, of brisk flavour. A very old variety, several forms of which are in cultivation.

Yellow Antwerp. Fruit medium-sized, pale yellow, rich and sweet. An abundant bearer.

RASPBERRY JAM-TREE. A common name for *Acacia acuminata.*

RASPIS. An old name for Raspberry.

RATHEA. A synonym of **Synechanthus** (which *see*).

RATHKEA. A synonym of **Ormocarpum** (which *see*).

RATIBIDA. Included under **Rudbeckia** (which *see*).

RATONIA (from *Raton*, the name used by the Spaniards of St. Domingo, for one of the species). Including *Gelonium*. SYN. *Arytera*. ORD. *Sapindaceæ*. A genus comprising about forty-five species of usually tall trees, all tropical. Flowers small, pedicellate; racemes paniculate, often elongated, slender, many-flowered; calyx small, cup-shaped. Leaves alternate, exstipulate, abruptly pinnate; leaflets alternate or often opposite, entire or rarely serrated. The species are of little horticultural value.

RATS. These animals are far less destructive than mice in gardens and shrubberies, owing to their food being made up to a much less extent of seeds. Their burrows are at times a cause of annoyance in the neighbourhood of ponds or streams, to which they are partial. Their depredations in houses are well known to most persons; but dwelling-houses are more commonly invaded by them than garden-houses, in which food is less often procurable. They feed greedily on eggs, and will eat fledgling birds; hence, they are peculiarly objectionable where it is desired to encourage the smaller birds in pleasure-grounds and gardens. There are, however, instances in which Rats prove themselves very destructive, the worst being, perhaps, when they attack a house of ripe Grapes. The channels in which the hot-water pipes are situate sometimes afford the animals either a means of entry to and exit from the house, or

Rats—*continued.*

else a hiding-place, and it is often difficult to dislodge them before much mischief has been done. They ascend the Vine-rods, and eat off the bunches or berries wholesale, either carrying away or partially devouring them. Sometimes, they enter at night by a front sash, or even from the roof, if the ventilators are left open, and an attack has been once commenced. If Rats are about the garden, the bottom sashes of vineries should always be closed at night, especially after the Grapes are ripe. A plan of prevention, which has been found partially, though not wholly, successful, is tying some brown paper round the rods, 2ft. or so clear above the ground, in the shape of a bell. This prevents the Rats ascending the rods, but, as already stated, their means of ascent are not always confined to these. Rats are also troublesome at times amongst wall fruit-trees outside, by carrying away the fruit when ripening. Poison is the most effective method of destruction, where it can safely be laid down, but the animals often die in places where the stench arising from decomposition proves, for a few days, almost unbearable in the locality.

The Brown or Norway Rat (*Mus decumanus*) is now almost the only kind of true Rat found in Britain, since the Black Rat (*Mus rattus*), formerly very abundant all over the country, has disappeared before the Brown species, probably devoured by the latter. Both are believed to have entered Europe from Asia, and to have spread westward—the Black Rat having come into Europe about the twelfth century of our era, and the other in the sixteenth century. The Brown Rat was first observed in England about 1730. It has spread all over the world by the aid of shipping, and is now very widely naturalised. The Black Rat is distinguished by its fur being greyish-black above, and ashy beneath, and by the tail being a little longer than the body. The Brown Rat is a good deal larger than the Black, and has the fur greyish-brown above, and yellowish-grey beneath; and the tail is a little shorter than the body. It requires to have free access to water, and its habitats are a good deal determined by this need. It is an excellent swimmer, and takes readily to the water.

Another so-called Rat is the Water Rat, or water vole (*Arvicola amphibia*), which is about the size of a small Brown Rat, but is clumsier in form, with a blunt head, short ears, and small eyes; the toes of the hind feet are connected at the base, and the tail is only about half as long as the body. This animal burrows in the banks of streams, and passes most of its time in the water. It is believed to feed almost exclusively on water plants and roots; hence, it is not often hurtful in gardens. The Brown Rats may be destroyed, when necessary, by traps, or by means of the poisons recommended for the destruction of **Mice** (which *see*); or ferrets may be employed to drive them from their holes. When they are very troublesome, the services of a rat-catcher may be resorted to with advantage.

RATTAN CANE. A common name for *Calamus Draco.*

RATTLE, RED. A common name for *Pedicularis sylvatica.*

RATTLE, YELLOW. *See* **Rhinanthus Crista-galli.**

RAUWOLFIA (named in honour of Leonhard Rauwolf, physician at Augsburg, who travelled through Palestine and other Eastern countries in 1753-5). Including *Ophioxylon.* ORD. *Apocynaceæ.* A genus comprising nearly forty species of stove, glabrous or rarely pubescent trees or shrubs, natives of tropical America, Africa, and Asia, and South Africa. Flowers and fruit usually rather small; calyx short, five-fid or five-parted, eglandulose; corolla salver-shaped, with a cylindrical

Rauwolfia—*continued.*

tube, a constricted throat, and five twisted lobes; peduncles alternating with the terminal leaves, few-flowered, or di- or trichotomously branched; cymelets usually umbelliform. Drupes two, distinct or connate in a two-stoned, bisulcate fruit. Leaves in whorls of three or four, or rarely opposite. Some of the species are rather pretty; the best-known are here described. They thrive in a compost of loam, peat, and sand. Cuttings, inserted in sand, under a glass, in heat, will root readily. All are shrubs, except where otherwise stated.

R. densiflora (dense-flowered). *fl.* white, many in a shortly-pedunculate cyme; corolla limb almost equalling the tube. June. *fr.* one-seeded. *l.* lanceolate, acuminate, approximating, sometimes ternate. *h.* 6ft. East Indies, 1824. (B. R. 1273, under name of *Tabernæmontana densiflora.*)

R. majus (larger). *fl.* in terminal cymes; corolla white, smaller than in *R. serpentina.* April. *fr.* violet, resembling an olive in shape. *l.* shortly petiolate, elliptic-oblong, acute, paler beneath, quaternately whorled, entire. *h.* 4ft. Java, 1850. A robust species.

R. nitida (shining). *fl.* in terminal, few-flowered cymes, shorter than the leaves; corolla white. August. *fr.* at first yellow, becoming dark purple, sub-globose, bilobed. *l.* quaternate, ovate-lanceolate, acute at both ends, glabrous and shining, the larger ones 4in. to 5in. long, 1¼in. to 1½in. broad. *h.* 10ft. Spain, 1752. Tree.

R. serpentina (serpentine). *fl.* in sub-umbellate corymbs; corolla white or pink, narrow, nearly ⅔in. long. May. *fr.* red, globose. *l.* 3in. to 6in. long, 1½in. to 2½in. broad, membranous, on petioles ¼in. to ⅔in. long. *h.* scarcely more than 1ft. East Indies, 1680.

R. ternifolia (ternate-leaved). *fl.* in axillary, few-flowered cymes; corolla white. May. *fr.* about the size of a pea. *l.* ternate, oblong, acuminate, acute at base, reticulate-veined, 1½in. to 2in. long, six to eight lines broad, on very short petioles. Branches rarely warted. *h.* 3ft. West Indies, 1823. (B. M. 2440.)

RAUWOLFIA (of Ruiz and Pavon). Included under *Citharexylum.*

RAVENALA (said to be the native name of the plant in Madagascar). SYN. *Urania.* Including *Phenakospermum.* ORD. *Scitamineæ.* A genus comprising a couple of species of noble, stove plants, one of which is a native of North Brazil and Guiana, and the other indigenous in Madagascar. Flowers many in a spathe, large, on very short pedicels, shortly racemose; sepals three, long, narrow, acuminate; petals three, the outer one shorter and slightly complicate, the lateral ones long, similar to the sepals, but smaller; stamens five, slightly shorter than the petals; scapes or peduncles in the upper axils; bracts spathaceous, many, boat-shaped, acuminate, bifariously spreading. Leaves very large, clustered, flabellately bifarious; petioles long and concave at base, scarcely sheathed. Stem sometimes short, with sub-radical leaves, sometimes erect and woody (as high as 30ft.), built up of the sheaths of the leaf-stalks, the other parts of the leaves having fallen off. *R. madagascariensis* is called by the French the Traveller's Tree, probably on account of the water which is stored up in the large, cup-like sheaths of the leafstalks; its seeds are edible. For culture, *see* **Musa.**

P. guianensis (Guiana). *fl.* white; spathes seven, boat-shaped, deflexed, 1ft. to 1½ft. long; scape tall. *l.* distichous, oval-elongated, as long as the petioles. *h.* 15ft. Brazil and Guiana, 1848.

P. madagascariensis (Madagascar). *fl.* white, clustered in alternate, boat-shaped spathes, 7in. long; thyrse axillary, 1½ft. long. *l.* flabellately disposed, long-stalked, sheathed at base, alternate. Caudex tall, arboreous. Madagascar. See Fig. 358, page 280. (F. d. S. 1355; I. H. 1860, 234.) SYN. *Urania speciosa.*

RAVENEA (named in honour of Louis Ravené, a zealous promoter of horticulture at Berlin). ORD. *Palmæ.* A monotypic genus. The species is a slender, stove palm, nearly allied to *Hyophorbe.* For culture, *see* **Areca.**

R. Hildebrandtii (Hildebrandt's).* *fl.* greenish-white, dioecious, on a simply-branched, stalked, fleshy spadix; calyx cup-shaped, three-lobed; petals three, oblong-lanceolate. *l.* long-stalked; leaflets lanceolate, very acute, smooth, light green; rachis cylindrical. *h.* (when mature) 10ft. Comoro Islands, 1878. A graceful, ornamental palm, in habit like some Chamædoreas. (B. M. 6776; I. H. xxvii. 164.)

RAVENIA (no explanation given by author). Including *Lemonia*. ORD. *Rutaceæ*. A genus comprising only a couple of species of highly glabrous, stove or warm greenhouse shrubs, with terete branchlets; one is a native of Cuba, and the other Brazilian. Flowers white or scarlet, few, on axillary, elongated peduncles; sepals unequal, imbricated, the two outer ones larger; corolla tube straight; limb sub-oblique, of five oblong lobes; stamens five, adnate to the throat of the corolla. Leaves opposite, one to three-leafleted; leaflets sub-coriaceous, lanceolate, entire, slightly dotted. The species are beautiful shrubs, thriving in sandy peat and fibry loam. Propagated by cuttings of half-ripened shoots, inserted in sand, under a bell glass, in bottom heat.

R. rosea (rose-coloured). *fl.* rose-red, axillary, 2½in. to 3in. in diameter. Summer. *l.* trifoliolate; leaflets elliptic-obovate, entire, shining. *h.* 2ft. Brazil, 1880.

R. spectabilis (showy). *fl.* deep reddish-scarlet, showy; corolla fleshy, rugulose, hypocrateriform, the segments obtuse; racemes axillary, few-flowered, nearly equalling the leaves. July and August. *l.* trifoliolate; leaflets longer than the pubescent petiole, obovate, obtuse, glabrous. Branchlets pubescent. *h.* 2ft. Cuba, 1839. (B. R. xxvi. 59, under name of *Lemonia spectabilis*.)

RAY. *See* **Radius.**

FIG. 358. RAVENALA MADAGASCARIENSIS (see page 279).

RAY FLOWERS. Those which belong to the margin of a circular flower cluster, and differ from those of the disk, being usually larger.

RAY POD. A common name for *Damasonium stellatum*, the plant described in this work as *Actinocarpus Damasonium*.

REANA. A synonym of *Euchlæna*.

REAUMURIA (named in honour of René A. Ferchault de Réaumur, 1683-1757, a famous French entomologist). ORD. *Tamariscineæ*. A genus comprising about half-a-score species of half-hardy, much-branched, procumbent or divaricate sub-shrubs or small shrubs, natives of the Mediterranean region (mostly Eastern) and central Asia. Flowers terminal, solitary, larger than in *Tamarix*; sepals five, sub-connate or nearly free at base, surrounded by few or many imbricated, sepaloid bracts; claws of the petals broad; stamens many. Leaves small or fleshy, sub-terete, often clustered. *R. hypericoides*, the species best known to gardeners, is a beautiful shrub, of easy culture; a compost of sandy loam and peat is most suitable. It may be readily increased by means of cuttings taken from the young wood, and inserted in similar soil, under a bell glass.

R. hypericoides (St. John's Wort-like).* *fl.* purple; petals irregular, ovate or ovate-oblong, very obtuse, the appendices short and slightly fimbriated at apex; bracts lanceolate-subulate, a little longer than the calyx. August. *l.* coriaceous; cauline ones linear, linear-lanceolate, lanceolate-oblong, or lanceolate. *h.* 2ft. Syria, 1800. (B. M. 2057; B. R. 845.)

REAUMURIACEÆ. Included under *Tamariscineæ*.

RECEPTACLE. "A portion of axis forming a common support or bed on which a cluster of organs is borne. The Receptacle of the flower, or the torus, is the axile portion of a blossom, that which bears sepals, petals, stamens, and pistils. The Receptacle of an inflorescence is the axis or rachis of the head, spike, or other dense cluster" (Asa Gray).

RECHSTEINERA. Included under *Gesnera*.

RECLINATE, RECLINED, RECLINING. Falling or turning backward, so that its upper part rests on the ground or some other object; *e.g.*, the branches of many trees.

RECTISERIAL. Disposed in rectilinear ranks.

RECURVED. Bent, but not rolled, backwards or downwards.

RED BERRY, AUSTRALIAN. *See* **Rhagodia.**

RED BUD. A common name for *Cercis canadensis*.

RED CAMPION. *See* **Lychnis diurna.**

RED CEDAR. *See* **Juniperus virginiana.**

REDHEAD. A common name for *Asclepias curassavica*.

RED-HOT POKER. A common name of *Kniphofia aloides*.

RED LYCHNIS. *See* **Lychnis diurna.**

RED MAGGOT. The name popularly given to small orange or lemon-coloured grubs, which are often to be found in the flowering-heads of grasses, between the glumes. They seem to feed on the juices or sap of the female part, or ovary, of each flower, and thereby prevent the formation of seeds. On cereals, *e.g.*, Wheat, they are often very abundant, and do very great harm to the produce of the crops. The grubs are wrinkled into folds crosswise. They are not provided with feet, but can wriggle along freely; they do not exceed $\frac{1}{12}$in. in length. When full-fed, they become orange pupæ, either in the ear, or on falling to the ground, into which the larvæ burrow before the change. From these pupæ, small, two-winged flies—the Wheat-midges (*Cecidomyia Tritici* and *Lasioptera obfuscata*)—emerge in June and July. The former species is orange or dull yellow, with black eyes, and has the longest vein in each wing unbranched. The latter insect has the body blackish, and the longest vein in the wing is forked. The females lay eggs in the young spikelets of the cereals, by means of a long, flexible tube or ovipositor.

Remedies are required in farming only, as these Midges are hardly ever troublesome in gardens. It has been found very useful to plough so as to bury the surface sods 6in. or 7in. deep; and it is well to sow cereals so as not to ear when the Midges are on the wing. Burning stubble, chaff, &c., has been found of considerable service against them.

RED MOROCCO. A common name for *Adonis autumnalis*.

RED OSIER DOGWOOD. *See* **Cornus stolonifera.**

REDOUTEA. A synonym of **Fugosia** (which *see*).

RED ROOT. *See* **Lachnanthes.** The name is also applied to *Ceanothus americanus*.

RED ROT. A common name for *Drosera rotundifolia*.

RED ROT. A name employed to denote a decayed state of the stem in various Conifers, seldom in other trees, in which the wood becomes decayed and red, and this condition spreads gradually from place to place. The disease is of common occurrence over a great part of Europe. A careful microscopic examination of the diseased wood proves that the cells are full of an abundant mycelium of a Fungus; and Prof. Hartig has shown that the discoloration may be due to more than one Fungus, of which the more important is a species of **Trametes** (which *see*). *Polyporus sulphureus* (*see* **Polyporus**) has been observed to cause a similar condition in Dicotyledonous trees, *e.g.*, Pear-trees, &c.

Treatment. The whole tree, unless valuable, should be cut into firewood and destroyed. If the tree is so valuable as to render its preservation desirable, the diseased portions should be removed and burned, and the conidia ought on no account to be permitted to spread, to the injury of adjacent trees. It is not possible, in the present state of our knowledge, to destroy the mycelium without injuring the wood-cells in which it lies.

RED SPIDER (*Tetranychus telarius*). A small, eight-legged mite, which receives its popular name from its colour (which is almost always between rusty-red and brick-red) and its power, like a spider, of spinning a fine web on the lower surface of the leaves of trees. It is not a true spider. Gardeners are but too well acquainted with its depredations on fruit-trees and hot-house plants, the leaves of which it frequently injures very much. For a full account of Red Spider, and of remedies against it, *see* **Tetranychus telarius.**

REDUPLICATE. Folding and projecting outwards.

RED-WATER-TREE. *See* **Erythrophlœum.**

RED WEED. *See* **Papaver Rhœas.**

RED-WOOD-TREE. A common name for various species of *Ceanothus*, *Pterocarpus*, &c.

REED. *See* **Arundo.**

REED, INDIAN. A common name for *Canna indica*.

REED MACE. *See* **Typha latifolia.**

REEL AND LINE. Garden Lines are indispensable for marking off spaces when cropping, and for indicating the positions of plants, trees, edgings, &c. A long Line should be wound on an iron Reel, as this permits it to dry more readily, after being used in the wet, than it would if rolled up closely on an ordinary stick. A Line Reel is usually made to revolve on a long iron pin by turning a small handle or projection on the upper cross-bar. Various sizes are made, to suit different lengths, of Lines.

REEVESIA (named in compliment to John Reeves, F.L.S., of Canton, a zealous botanist, and the introducer of one of the species). ORD. *Sterculiaceæ*. A genus consisting of two (?) species of greenhouse trees, natives of tropical and sub-tropical Eastern Asia. Flowers white, in terminal, corymbose panicles; calyx clavate-campanulate, irregularly three to five-fid; petals clawed. Leaves entire, coriaceous. *R. thyrsoidea*, the only species introduced, is a very handsome tree, requiring treatment similar to that recommended for the greenhouse species of **Sterculia** (which *see*).

R. thyrsoidea (thyrse-flowered). *fl.*, petals white or cream-coloured, five-clawed; peduncles and pedicels clothed with stellate pubescence. July. *l.* alternate, broadly lanceolate, acuminate, petiolate, entire, penninerved; petioles slender, dilated upwards. *h.* (under cultivation) 3ft. to 4ft. China, 1826. (B. M. 4199; B. R. 1236.)

REFLEXED. Abruptly turned or bent backwards or downwards.

REFRACTED. Similar to Reflexed, but abruptly bent from the base.

REGELIA (named after Dr. E. Regel, Superintendent of the Imperial Botanic Gardens at St. Petersburgh). ORD. *Myrtaceæ*. A genus comprising only three species of rigid, greenhouse shrubs, with the habit of *Beaufortia*, natives of Western Australia. Flowers closely sessile and solitary within each bract, in dense heads, at first terminal, but the central axis soon growing out into a leafy branch; calyx tube ovoid or nearly globular; lobes five, usually deciduous; petals five, spreading; stamens indefinite, united in five bundles opposite the petals. Leaves small, opposite, mostly three or more nerved. *R. ciliata* is the only species yet introduced. For culture, *see* **Beaufortia.**

R. ciliata (fringed).* *fl.* red, in small, dense, globular heads; calyx tube woolly-tomentose or hairy. *l.* erect, spreading or recurved, broadly ovate, obovate, or almost orbicular, obtuse, flat or concave, rigid, prominently three or rarely five nerved, ¼in. to ½in. long. *h.* 3ft. to 5ft. 1874. A spreading, more or less pubescent or hairy shrub. (B. M. 6100.)

REGELIA (of Lemaire). A synonym of **Karatas** (which *see*).

REGELIA. A garden synonym of **Verschaffeltia** (which *see*).

REGULAR. Uniform and symmetrical in shape of structure.

REHMANNIA (named in honour of Joseph Rehmann, a physician of St. Petersburgh, 1779-1831). ORD. *Scrophularineæ*. A genus comprising only a couple of species of hardy, perennial herbs, natives of China and Japan. Flowers rather large, in the axils of the bracts or floral leaves, declinate or pendulous, disposed in terminal racemes; calyx ovoid-campanulate, five-fid at apex; corolla dark purplish or pale, intensely coloured at the throat; limb oblique, sub-bilabiate, with spreading lips. Leaves alternate, obovate or oblong, deeply

Rehmannia—*continued.*

toothed. One of the species has been introduced. It thrives in any ordinary soil, but, though hardy, it will succeed best in a cool greenhouse. Propagation may be effected by cuttings.

R. glutinosa (glutinous). *fl.*, lower ones pedicellate; upper ones sessile; corolla wholly or partially of a dingy purple, 1in. long. April. *l.*, radical ones opposite, but most of them alternate, very shortly stalked, 1in. to 3in. long, acute or obtuse, decreasing upwards. Stem 1ft. to 2ft. high, erect, and, as well as the calyx and under side of the leaves, often purplish. North China, 1835. (B. M. 3653, B. R. 1960, and F. d. S. 1134, under name of *R. chinensis*.)

REICHARDIA (of Dennstaedt). A synonym of **Tabernæmontana** (which *see*).

REICHARDIA (of Roth). A synonym of **Pterolobium** (which *see*).

REICHELIA. A synonym of **Hydrolea** (which *see*).

REIDIA. Included under *Phyllanthus.*

REINECKEA (named in honour of J. Reinecke, a German gardener and successful cultivator of tropical plants). SYNS. *Liriope* (of Salisbury), *Sanseviella.* ORD. *Liliaceæ.* A monotypic genus. The species is a hardy, herbaceous perennial, with a creeping rhizome, thriving in almost any soil. It is readily propagated by division.

R. carnea (flesh-coloured). *fl.* flesh-colour, sweet-smelling, in simple, solitary spikes, under membranous bracts; scape firm, 1in. to 2in. high; bracts deltoid-cuspidate, tinged with red. April. *l.* six to twelve, sub-erect, glabrous, 6in. to 12in. long, ½in. to ¾in. broad. Rhizome broadly creeping. China and Japan, 1792. SYNS. *Sanseviera carnea* (A. B. R. 361), *S. sessiliflora* (B. M. 739).

R. c. variegata (variegated).* *l.* much striped. (I. H. 323.)

REINECKIA. A synonym of **Synechanthus** (which *see*).

REINWARDTIA (of Dumortier) (named after K. G. K. Reinwardt, 1773-1822, director of the Botanic Garden at Leyden). SYN. *Macrolinum.* ORD. *Lineæ.* A small genus (three species) of greenhouse or stove shrubs or sub-shrubs, inhabiting the mountains of the East Indies. Flowers yellow or white, rather large, in very short, fascicle-like racemes, solitary in the axils, or densely corymbose at the tips of the branches; sepals and petals five, the latter fugacious, twisted; stamens connate at base, hypogynous; pedicels bracteate. Leaves alternate, membranous, often serrate, penninerved. *R. tetragynum* and *R. trigynum*, the only species calling for mention here, are old, winter-flowering, warm greenhouse plants, worthy of a more extensive cultivation than they at present receive. Cuttings should be taken from the strongest points of old plants, and inserted, in a close propagating frame, some time during April or May. When rooted, they may be grown on singly, in an intermediate temperature, until established, in 5in. or 6in. pots. Pinching should be frequently practised, when the plants are young, to induce a compact habit. A position in frames, where plenty of air and sun can be admitted, is best in autumn, as it is necessary to thoroughly ripen the recently-made shoots for flowering during the winter. A temperature of about 55deg. will be necessary to open the flowers properly, and keep them from damping-off. Old plants may be cut back, and grown a second year under similar treatment; but they are not generally so strong or satisfactory as new ones annually raised from good cuttings. Red Spider is the most destructive insect to which the plants are subject; frequent and heavy syringings, applied throughout the summer, will keep it in abeyance, and also prove beneficial to the plants.

R. tetragynum (four-styled). *fl.* often 1in. in diameter; styles three or four, united below. *l.* elliptic-lanceolate, acuminate, crenate-serrated. India. Shrub.

R. trigynum (three-styled).* *fl.* yellow, solitary, or a few umbellately clustered; petals obovate, emarginate, the claws connate into a tube. October. *l.* ovate-oblong, entire, aristate-mucronate; stipules minute. *h.* 2ft. to 3ft. 1799. Shrub. (B. M. 1100, under name of *Linum trigynum.*)

Reinwardtia—*continued.*

REINWARDTIA (of Blume). A synonym of **Saurauja** (which *see*).

REINWARDTIA (of Korthals). Included under **Ternstrœmia** (which *see*).

RELHANIA (named in honour of the Rev. Richard Relhan, who published, in 1785, the "Flora Cantabrigensis"). SYN. *Michauxia* (of Necker). Including *Eclopes.* ORD. *Compositæ.* A genus comprising about eighteen species of greenhouse shrubs or annual herbs, natives of South Africa. Flower-heads yellow, mediocre or rather large and solitary at the tips of the branches, or smaller and solitary at the sides of the branches, or in terminal corymbs; involucre oblong, ovoid, or rather broadly campanulate, with many-seriate bracts; receptacle flat; achenes linear, glabrous or ciliated on the margins. Leaves alternate or rarely opposite, rigid, narrow or small, channelled and concave above, keeled or many-nerved at back. Several species have been introduced, but are probably not now in cultivation. *R. pungens*, the only one which calls for description here, requires culture similar to that recommended for **Athanasia** (which *see*).

R. pungens (prickly). *fl.-heads* yellow, terminal, sessile, solitary, more than 1in. in diameter; ray florets numerous, reddish down the middle of the back. September. *l.* acerose, rigid, sessile, ascending, scattered, rather wide-set, linear-subulate, about ¾in. long, entire, roughened by short, hard, inclined bristles on the outside. Young branches grey-tomentose. 1820. A small, weak, branching shrub. (B. R. 587.)

REMACLEA. A synonym of **Trimezia** (which *see*).

REMUSATIA (named in honour of Abel Remusat, 1785-1832, a celebrated Orientalist and physician). ORD. *Aroideæ* (*Araceæ*). A genus comprising three or four species of stove, tuberous herbs, natives of the mountainous regions of the sub-tropical East Indies and Java. Flowers monœcious, on an inappendiculate spadix, which is shorter than the spathe, sessile, and constricted in the middle; male and female flowers remote; male inflorescence clavate, stipitate, the female narrower and sub-cylindrical; spathe with a convolute, persistent, green tube, a constricted throat, and a yellowish, spreading or refracted, at length split and deciduous lamina; peduncles short. Leaves on long and slender stalks, peltate, ovate-cordate, or lanceolate. Only one species is known to cultivation. It requires culture similar to **Caladium** (which *see*).

R. vivipara (viviparous). *l.* petioled, peltate, cordate, entire, 4in. to 12in. long, and 3in. to 8in. broad, acute, smooth on both sides; posterior lobes obtuse. Scales of the bulbs each ending in a hooked bristle. East Indies. (L. B. C. 281, under name of *Caladium viviparum.*)

RENANTHERA (from *ren*, a kidney, and *anthera*, an anther; alluding to the reniform shape of the anthers or pollen masses). SYN. *Nephranthera.* ORD. *Orchideæ.* A genus comprising about seven species of stove, epiphytal orchids, natives of tropical Asia and the Malayan Archipelago. Flowers showy or rather small; sepals much spreading, free, petaloid, the lateral ones broader and often longer than the dorsal one, which latter the petals resemble; lip short, sessile at the base of the column, articulated, saccate or spurred; column short and thick; anthers terminal, convex; pollen masses two, ovoid or oblong; peduncles lateral, elongated, branched; racemes loose, ample, panicled. Leaves distichous, spreading, fleshy or rigid, often obliquely bilobed at apex. Stems leafy, branched, not pseudo-bulbous. The best of the species here mentioned are *R. coccinea*, *R. Lowii*, and *R. Storiei*; the first requires warm-house treatment, and should be fastened on a stump of Tree-fern or Ash, against which it will grow to a great length, and flower

Renanthera—*continued.*

freely every summer, if placed in a sunny position and kept moist. *R. Lowii* should be grown in the hottest and moistest house, in a sunny position; but its roots prefer a large pot filled with drainage, sphagnum, and lumps of fibry peat. *R. Storiei* is a rare plant, seldom seen in cultivation, and then always in bad health. It is usually potted in sphagnum and crocks, and placed in a tropical house along with *Phalænopsis*. The other species, not already mentioned, require similar treatment.

R. coccinea (scarlet).* *fl.* of a beautiful blood-red within, disposed in very large panicles; lateral sepals oblong-spathulate, obtuse; dorsal one and petals linear-ligulate; middle lobe of lip bigibbous at base; spur acute, conical, straight. *l.* ligulate, obliquely emarginate at apex. Aerial roots very long. Cochin China, 1816. A splendid plant. (B. M. 2997; B. R. 1131.)

R. elongata (elongated). *fl.* purplish; lateral sepals unguiculate; lateral lobes of lip sometimes sinuate, the middle lobe triangular and very short, bicallous at base; spur obtuse, conical; panicle elongated, nodding. *l.* broadly linear, oblique, emarginate. Kuripan. (B. R. 1843, 41.)

R. histrionica (acting). *fl.*, sepals and petals yellow, bordered with purplish blotches; lip white, with purplish blotches on the side lobes; spur orange; racemes short, few-flowered. *l.* acuminate. Malacca (?), 1878.

R. Lowii (Low's).* *fl.* of two kinds on the same spike, the lowest pair always tawny-yellow enlivened with crimson dots, the remainder pale green, almost hidden on the inner side by large, irregular blotches of reddish-brown; sepals and petals waved, lanceolate, acute, those of the lowest pair more blunt; spikes pendent, 6ft. to 12ft. long, bearing from thirty to fifty flowers. Stems caulescent, 1in. thick, climbing to a great height. Borneo. (B. M. 5475.) The correct name of this plant is now *Arachnanthe Lowei*.

R. matutina (morning). *fl.* at first of a very beautiful blood-colour, paler outside, the disk of the lateral sepals golden, the bases of the petals striped with dark purple; lip very minute, dark purple; panicles much-branched, 2ft. to 3ft. long; peduncles intense purple. *l.* ligulate, obtuse and unequally bilobed at apex; sheaths sometimes violet.

R. m. breviflora (short-flowered). A distinct variety, differing from the type in its shorter sepals, the lateral ones more free from one another, and the calli under the column larger. Sunda Isles, 1879.

R. moluccanum (Moluccan). *fl.* red, dotted; sepals all linear-ligulate; lateral lobes of lip bilobulate; middle lobule not callous at base; peduncles long-exserted at the apex of the panicle. *l.* shortened, oblong, obtusely bilobed at apex. Amboyna, 1846.

R. Storiei (Storie's). *fl.* more than 2in. across; dorsal sepals and petals dark orange; lower sepals broad, of a brilliant velvety-crimson, with lighter shades of the same colour; lip small, deep crimson, with small yellow bars, centre white. Philippines, 1880.

RENEALMIA (named in honour of Paul Renealme, a French botanist, who published, in 1611, a "History of Plants"). SYNS. *Ethanium, Gethyra, Peperidium.* ORD. *Scitamineæ.* A genus comprising about fourteen species of stove, herbaceous perennials, natives of tropical America, one being also found in tropical Western Africa. Flowers one to three or many, beneath membranous, but not imbricating, bracts; calyx cup-like or loosely tubular, shortly trilobed; corolla tube short or rarely longer than the calyx, the lobes erect, or at length spreading, subequal, or with the dorsal one broader; raceme or thyrse sometimes on a leafless, scaly scape from the rhizome, sometimes at the tip of a terminal, leafy stem. Leaves two-ranked. The only species known to cultivation requires culture similar to **Alpinia** (which *see*).

R. exaltata (exalted). *fl.* scarlet, on one- to three-flowered pedicels; scape coloured, villous; raceme elongated; bracts lanceolate, as long as the flowers. July. *fr.* blackish-violet, oval, 1in. long, with aromatic seeds. *l.* sessile, lanceolate, glabrous. *h.* 2ft. (sometimes, in a wild state, 8ft. to 10ft. or more). West Indies, 1820. (B. M. 2494 and B. R. 7771, under name of *Alpinia tubulata*.)

RENEALMIA (of Linnæus). A synonym of **Tillandsia** (which *see*).

RENEALMIA (of Houttuyn). A synonym of **Villarsia** (which *see*).

RENEALMIA (of Robert Brown). A synonym of **Libertia** (which *see*).

RENIFORM. Kidney-shaped. A Reniform leaf with crenated margin is shown at Fig. 359.

FIG. 359. RENIFORM LEAF, WITH CRENATED MARGIN.

RENSELAERIA. A synonym of **Peltandra** (which *see*).

REPAND. Applied to a leaf which has its margins slightly uneven.

REPENS, REPENT. Creeping; lying flat upon the ground, and emitting roots at the same time.

REPLICATE. Folded backwards.

REPLUM. The frame left in certain fruits by the falling away of the valves in the act of dehiscence.

REPTANT. The same as **Repens** (which *see*).

REQUIENIA. Included under **Tephrosia** (which *see*).

RESEDA (the old Latin name used by Pliny, from *resedo*, to calm or appease; the application of the plants to external bruises was considered useful by the Latins). Mignonette. ORD. *Resedaceæ.* A genus of annual or biennial, hardy, erect or decumbent, glabrous or pilose herbs. About twenty-six may lay claim to specific rank; these are mostly natives of South Europe and North Africa, and are also found in Syria, Persia, and Arabia. Flowers racemose, bracteate; calyx four to seven-parted; petals hypogynous, four to seven, unequal, two to many-fid; torus sub-sessile. Capsule indehiscent, three-lobed at apex. Leaves entire, lobed or pinnatisect; stipules gland-formed. *R. lutea* and *R. Luteola* (Dyers' Rocket, Dyers' Weed, or Dyers' Yellow Weed) are natives of Britain. The latter plant was formerly in great demand for dyeing purposes. Few of the species are of any great value to horticulturists. *R. odorata*, the common Mignonette, is one of our most highly-valued and sweet-scented garden plants. For culture, enumeration of varieties, &c., *see* **Mignonette.**

R. alba (white). *fl.* with white petals and brownish anthers, disposed in dense spikes; calyx five or six-parted. May to September. *l.* all pinnatifid or sometimes interruptedly pinnate; segments lanceolate, smooth, rarely waved. *h.* 2ft. South Europe, 1596. Hardy biennial. (S. F. G. 459.)

R. frutescens (shrubby). A form of *R. odorata*.

FIG. 360. CAPSULE OF RESEDA ODORATA.

R. odorata (fragrant).* Common Mignonette. *fl.* with yellowish-white petals and saffron anthers, disposed in loose racemes; calyx six-parted, equalling the petals, which are finely cleft into many club-shaped divisions. June to October. *l.* lanceolate, bluntish, entire or trifid. North Africa, Egypt, &c., 1752. Plant diffuse. See Fig. 360. (B. M. 29.) The variety *frutescens* is merely a shrubby form of this species. (B. R. 227.)

RESEDACEÆ. A small natural order of annual or perennial herbs, rarely shrubs, mostly found in South Europe, North Africa, Syria, Asia Minor, and Persia; a few reach the Indian frontier, and three inhabit the Cape Colony. Flowers hermaphrodite or rarely unisexual, racemose or spicate, one-bracted; calyx persistent, four to seven-parted, unequal or almost equal, the segments imbricated; petals four to seven, rarely two (or none), deciduous or persistent, hypogynous or perigynous, entire or three or many-fid, ample, or with a membranous

Resedaceæ—*continued.*

appendix at the base, free or rarely sub-coherent, open in æstivation; disk hypogynous, sessile or stipitate, often dilated behind; stamens three to forty, perigynous or inserted within the disk, not covered by the petals in æstivation; filaments free or monadelphous at base; anthers two-celled, introrse. Fruit a capsule, closed or gaping at the apex, rarely a berry, sometimes follicular; seeds many, rarely few. Leaves scattered or fascicled, simple, trifid, or pinnatiparted; stipules small, gland-like. Mignonette (*Reseda odorata*), one of the members of this order, requires no eulogy here. The Dyers' Weed (*R. Luteola*) yields a yellow dye, which is largely used; its leaves are very bitter. The order comprises half-a-dozen genera, and, according to the authors of the "Genera Plantarum," not more than thirty distinct species. *Reseda* is the principal genus.

RESIN, ANIME. *See* **Hymenæa Courbaril.**

RESIN PLANT. A common name for *Bursera acuminata* and *B. gummifera*, *Dammara australis*, *Guaiacum officinale*, *Pistacia Lentiscus*, &c.

REST-HARROW. *See* **Ononis.**

RESTIACEÆ. A natural order of usually perennial herbs, tufted or with horizontal or creeping rhizomes; they are mostly natives of South-west Africa or Australia, a few are found in New Zealand, one in Chili, and one in Cochin China. Flowers dicœcious, rarely monœcious, very rarely hermaphrodite, in spikelets; perianth regular; segments six, rarely reduced to five, four, or three, glumaceous, rigid, scarious, or hyaline, more or less distinctly biseriate; stamens in male flowers three, filaments filiform; ovary of females one to three-celled; inflorescence variable. Fruit dry, often small, nut-like or capsular, terete, compressed, or triquetrous. Leaves sometimes few, radical, long, cyperoid, frequently nearly all reduced to sheaths. Stems rigid, simple or branched, erect, flexuous, or variously twisted. The order comprises twenty genera, and about 230 species, few of which are of any horticultural value. Examples: *Restio*, *Willdenowia*.

RESTING. Plants are said to be Resting during any period when growth in them is inactive. The term is only applicable to such as live over one year: nearly all of these require a Resting season after completing their annual growth.

RESTIO (from *restis*, cord; alluding to the use of the plants in South Africa). Rope Grass. SYNS. *Craspedolepis*, *Ischyrolepis*, *Megalotheca*, *Rhodocoma*. The principal genus of ORD. *Restiaceæ*. It consists of about 100 species, none of which are of any special interest; several have been introduced to this country.

RESTREPIA (named in honour of Joseph E. Restrep, a naturalist who travelled in South America). ORD. *Orchideæ*. A genus of stove orchids, with tufted stems, or having simple, creeping branches. About a score species have been described, natives of tropical America, from Brazil as far as Mexico. The genus is very closely related to *Pleurothallis*, but is distinguished by having four pollen masses; the habit is very similar, but the peduncles appear to be constantly one-flowered, and the flowers are often, but not always, larger. The undermentioned species are those best known to gardeners. For culture, *see* **Pleurothallis.**

R. antennifera (antennæ-bearing). *fl.* yellow, dotted with red or purple; lip linear, retuse, scabrous, trinerved, bearing tendrils close to the base. *l.* ovate, acute, shorter than the stems, occasionally rich purple on the under side; sheaths falcate, sometimes speckled with purple. Venezuela, &c., 1869. (B. M. 6288.) SYN. *R. maculata*.

R. Dayana (Day's). *fl.*, upper sepals and petals violet-brown, filiform, clavate; lower sepals connate into a broad, bifid piece, which is yellowish and brown; lip yellow, mottled with purple, ligulate. *l.* stout, roundish-acute, nearly heart-shaped at the base. Costa Rica, 1875. "A lovely little gem," of tufted growth.

Restrepia—*continued.*

R. elegans (elegant). *fl.* chiefly yellow, spotted with purple, much smaller than those of *R. antennifera*; lip linear, retuse, hollowed out and dilated at base, with a tooth on each side. *l.* oval, twice the length of the stems; sheaths straight. Caracas, 1872. (B. M. 5966; F. d. S. 743.)

R. Falkenbergii (Falkenberg's). *fl.* yellow, with some white and purple marks. *l.* large, bluish-purple beneath; sheaths one-coloured, without blotches. New Grenada, 1880.

R. Lansbergii (Lansberg's). *fl.*, upper sepals and petals crimson; front sepals white, with crimson dots; lip yellow, with purple blotches, unctuous, linear, truncate, scabrous, excavated and broader at the base. *l.* oval, equalling the stems; sheaths straight, closely imbricated. Venezuela, Guatemala, &c., 1861. This resembles small specimens of *R. antennifera*. (R. X. O. i., p. 170, t. 60.)

R. maculata (spotted). A synonym of *R. antennifera*.

R. prorepens (forward-creeping). *fl.* yellow, solitary, on a long, capillary peduncle, and nodding, bending the two straight, linear sepals forward, and having both widely clasping, the inferior connate, boat-shaped, much narrower towards the top; lip very small, scarcely equalling the column, pandurate, sub-acute, with a small angle before each base, and a lamella in each middle side. *l.* very small, narrow, fleshy, emarginate at apex, with a small apiculus between. Rhizomes creeping, in large masses. Costa Rica, 1877. (R. X. O. iv. 11-17.)

R. Reichenbachiana (Reichenbach's). *fl.* canary-yellow, on filiform peduncles, nearly 4in. long and cruciform, the tips of the inferior, connate sepals dark purple; these and the petals having also a dark purple line at the base, and the upper sepal two such lines. *l.* spathulate-oblong, obovate, minutely tridentate at the apex, about 2in. high. Costa Rica, 1875. Habit densely tufted. (R. X. O. ii. 5-10.)

R. xanthophthalma (yellowed-eyed). "A pretty species, with yellow-purple-blotched flowers." Guatemala and Venezuela. (B. M. 5257, under name of *R. Lansbergii*.)

RESUPINATE. Inverted in position; appearing as if upside down.

RESURRECTION PLANT. A common name for *Anastatica Hierochuntina*, *Mesembryanthemum Tripolium*, and *Selaginella lepidophylla*.

RETAMILIA. A synonym of **Retanilla** (which *see*).

RETANILLA (the Peruvian name of the genus). SYN. *Retamilia*. ORD. *Rhamneæ*. A small genus (two or three species) of almost leafless, unarmed, branched shrubs and sub-shrubs, natives of Chili and Peru. Flowers on short, sub-racemose or fasciculate branches, opposite, shortly pedicellate; calyx urceolate or campanulate; petals and stamens four or five. Drupes rather large, globose. Leaves very caducous, opposite, entire. The species are probably lost to cultivation in this country.

RETICULATED. Netted; in the form of network.

RETINARIA. A synonym of **Gouania** (which *see*).

RETINIA. A genus of small moths, belonging to the group of *Tortricidæ*, of some importance because of the damage inflicted by them on Scotch Firs and other *Coniferæ*. Several species occur in Great Britain, and the larvæ of all, so far as known, feed in the buds or young shoots of the *Coniferæ*. The moths vary from ½in. to nearly 1in. in spread of wing; the front wings are nearly three times as long as broad, with the tip rather rounded, and the front and hind borders slightly rounded; the hind wings are rather broad and pointed. The species of chief importance practically are the following, which may be distinguished in the adult state by the characters mentioned below:

1. Fore wings grey, with rusty-yellow tip of wing and head.

(*a*) Thorax dark brown; fore wings grey-brown, with paler cross-lines, and decidedly rusty-yellow tip; spread of wings, six and a half to seven lines	*duplana*.
(*b*) Thorax rusty-yellow in front; fore wings wider behind, spreading nine to ten lines, pale grey patch at tip, duller ochreous than in *R. duplana*; hind wings pale at base	*turionana*.

Retinia—*continued.*

2. Fore wings with brown-grey or black markings.

(*a*) Fore wings pale grey, with numerous dark markings, and a basal patch bordered by a rather sharply-angled line; spread of wings, eight and a half to ten and a half lines ..... *occultana.*

(*b*) Fore wings dark blackish-grey, with numerous irregular, silvery cross-streaks, most distinct along the hind margin, and white spots along the front margin; spread of wings, nine to eleven lines ..... *resinana.*

3. Fore wings bright reddish-orange.

(*a*) Fore wings paler along inner, and near front, margins, with several indistinct, silvery cross-lines beyond the middle of wing; spread of wings, ten to eleven lines..... *Buoliana.*

(*b*) Fore wings with basal patch well defined, and bordered by a yellow, silvery cross-line; beyond the middle are several very distinct, yellowish-silvery, irregular cross-streaks; spread of wings, nine to ten lines .. *pinicolana.*

These species are almost all considerably more common in Scotland than in England, though most of them may be met with wherever the food-plants grow. All reach the perfect stage some time between June and August. The females lay their eggs on the young buds and twigs. The larvæ hatched from these eggs gnaw their way into the buds and leading shoots, and bore into the pith, there to remain usually all winter, since they are still feeding in the following spring. They are of the usual form of the larvæ of *Tortricidæ*, with rather cylindrical, naked bodies and dark, horny heads and shields on segments just behind the heads. They have six true legs and ten prolegs, or claspers.

Almost any one of the species would deserve the name of Pine-bud Moth; but the name has been given to the species *R. turionana.*

The result of an attack on Firs by these larvæ is that the leading shoots may be hollowed out, even in the bud state, or they become bent, brown, and brittle; and the trees become distorted, because of the loss of these shoots, and the ill-development of the shoots that have taken their place in the course of growth. In general, there is a considerable outflow of resin from the wounds made by the larvæ; and this resin hardens on the surface and forms a protection during winter to the larvæ. *R. turionana* is hurtful especially to the buds. *R. Buoliana* and the others are more dangerous to the newly-formed shoots. *R. resinana* is called the Resin-gall Moth, because of the fact that the larva produces a false gall of resin, by exudation of resin over the place where it is boring into the wood. It is not unlike a half walnut in form, and may even reach nearly or quite to this size; but it is dirty-white in colour, and remains soft while it is occupied. The larvæ are said to pass two winters before they become pupæ, which they do in spring, and the moths emerge in June.

Remedies. Owing to the larvæ living entirely under cover, no external applications are of the least use: the only method found at all successful has been the removal and burning of all shoots that show signs of attack by any of the species of *Retinia.*

RETINIPHYLLUM (from *retine*, resin, and *phyllon*, a leaf; the leaves are covered with resin). SYN. *Commianthus.* ORD. *Rubiaceæ.* A genus consisting of half-a-dozen species of glabrous, pubescent or pilose, stove shrubs, natives of North Brazil and Guiana. Flowers white, flesh-colour, or pink, in terminal, simple spikes; calyx limb tubular, truncate, entire, or five-fid; corolla hypocrateriform, with five narrow, reflexed lobes; stamens five. Berries small, five-stoned, edible. Leaves opposite, petiolate, coriaceous, obovate or oblong, often abruptly

Retiniphyllum—*continued.*

acuminate, with numerous diverging nerves. For culture of the only species introduced, *see* **Hamiltonia.**

R. secundiflorum (side-flowering). *fl.* white, in clusters of from two to four; spikes axillary, pedunculate, side-flowered. July. *l.* obovate, obtuse or emarginate at apex, cuneate at base, coriaceous, pubescent beneath. *h.* 4ft.

RETINOSPORA. Included under **Chamæcyparis** (which *see*).

RETROFLEXED. The same as **Reflexed** (which *see*).

RETRORSE. Directed backwards or downwards.

RETROVERTED. Inverted.

RETUSE. Terminating in a round end, the centre of which is depressed.

RETZIA (named in honour of Anders Johan Retzius, 1742-1821, Professor of Natural History in the University of Lund). ORD. *Solanaceæ.* A monotypic genus. The species is a greenhouse, evergreen, erect shrub, with straight, densely-leafy branches. It will thrive in any light soil. Propagation may be readily effected by cuttings, inserted in sand, under a bell glass.

R. capensis (Cape). *fl.* red or orange, two or three at the nodes or in the axils, long, but almost concealed by the leaves; calyx semi-five-fid; corolla with an elongated tube, and five, rarely six or seven, short, induplicate-valvate lobes. May. *l.* whorled, long-linear, coriaceous, entire or with revolute margins, silky-pilose when young (and in the axils). *h.* 4ft. South Africa.

REVOLUTE. Rolled backwards from the margins or apex; *e.g.*, certain tendrils, and the sides and ends of some leaves.

RHABDOCRINUM. A synonym of **Lloydia** (which *see*).

RHACHIS. *See* **Rachis.**

RHACOMA (of Adanson). A synonym of **Leuzea** (which *see*).

RHACOMA (of Linnæus). A synonym of **Myginda** (which *see*).

RHADINOCARPUS. A synonym of *Chætocalyx.*

RHAGODIA (from *rhax*, *rhagos*, a berry; in reference to the characteristic fruit). Australian Red Berry or Sea Berry. ORD. *Chenopodiaceæ.* A genus comprising thirteen species of slender or robust, mealy or slightly tomentose, greenhouse shrubs, rarely herbs, confined to Australia. Flowers greenish, small or minute, clustered or rarely solitary, disposed in interrupted, terminal spikes or panicles. Fruit a small berry. Leaves alternate and sub-opposite, sessile or petiolate, linear, ovate, oblong, or cordate, entire or sinuately lobed. Five species have been introduced, but it is doubtful whether any remain in cultivation.

RHAMNEÆ. A natural order of erect or climbing, often prickly, very rarely tendrilled or glandulose trees, shrubs, or very rarely herbs, inhabiting warm and tropical regions. Flowers green or yellowish, hermaphrodite, rarely polygamous, dicœcious, small, usually disposed in axillary, loose or dense-flowered, sometimes unilateral cymes; calyx-tube obconical, turbinate, urceolate, or cylindrical, the limb of four or five erect or recurved lobes; petals four or five, inserted at the throat of the calyx, emarginate or lobed, sessile or clawed, or absent; stamens four or five, opposite to, and inserted with, the petals; filaments subulate or filiform, rarely dilated; anthers versatile, sometimes ovoid, with longitudinal dehiscence, sometimes reniform and one-celled by confluence of the cells at the top, and opening into two valves by an arched slit; disk perigynous, rarely absent. Fruit capsular or drupaceous, three, rarely one to four-celled. Leaves simple, stipulate, rarely exstipulate, opposite or nearly so, often coriaceous, entire or serrated (in *Colletieæ* often absent); stipules small, usually deciduous,

Rhamneæ—*continued.*

sometimes changed to thorns. The most useful genera, from an economic point of view, are *Rhamnus* and *Zizyphus*, the species of which yield medicinal juices, &c. *Rhamnus davuricus* and *R. tinctorius* yield the famous Green Indigo, the Lo-Kao of China. The order comprises thirty-seven genera, and about 430 species. Examples: *Hovenia*, *Paliurus*, *Pomaderris*, and *Rhamnus*.

RHAMNUS (from *Rhamnos*, the old Greek name used by Theophrastus). Buckthorn. Including *Frangula*. ORD. *Rhamneæ*. A genus embracing about sixty species of stove, greenhouse, or hardy shrubs or trees, inhabiting temperate and tropical regions. Flowers axillary, racemose or cymose; calyx four or five-fid, the tube urceolate, the lobes keeled within; petals four or five, cucullate or flat, or wanting; stamens four or five; filaments very short. Drupe berry-like, oblong or spherical, two or four-stoned. Leaves alternate, rarely sub-opposite, petiolate, deciduous or evergreen, penninerved, entire or toothed; stipules small, deciduous. Several of the species afford useful products, especially dyes, and the fruits of many possess violent purgative properties. Few of the plants are valuable from a garden standpoint. The hardy kinds grow in any ordinary soil, and may be propagated by layers, or by seeds. The stove and greenhouse species are easily grown in any light soil, and may be multiplied by cuttings, inserted in sand, under a glass (the stove kinds in heat). Except where otherwise stated, the under-mentioned species are hardy, deciduous shrubs.

R. Alaternus (Alaternus). *fl.* green, dicœcious, disposed in short racemes; petals wanting. April to June. *l.* ovate-elliptic or lanceolate, coriaceous, quite smooth, serrated. *h.* 20ft. Mediterranean region, 1629. There are several varieties of this species, the best being one with foliage broadly margined with silvery-white: this is known under the name of *R. A. variegata*.

R. alpinus (alpine). *fl.* greenish, dicœcious, four-parted; female ones with four-cleft stigmas. May and June. *fr.* black. *l.* oval-lanceolate, crenate-serrated, smooth, lined with many parallel nerves. *h.* 4ft. Europe, &c., 1752. (L. B. C. 1077.)

R. californicus (Californian). *fl.* greenish, pentandrous; panicles on short peduncles. May. *l.* coriaceous, about 2in. long, elliptic-oblong, entire, revolute on the margins, glabrous; young ones pubescent. *h.* 6ft. to 12ft. North America, 1874. An unarmed evergreen shrub. SYN. *R. oleifolius* (H. F. B. A. i. 44).

FIG. 361. FLOWERING AND FRUITING TWIGS OF RHAMNUS CATHARTICUS.

R. catharticus (cathartic). *fl.* green, ⅛in. in diameter, four-parted, solitary and fascicled in the axils of the fascicles of leaves on the previous year's wood. May to July. *fr.* black, ¼in. in diameter. *l.* ovate, acutely-serrated, 1in. to 2in. long, fascicled at the ends of the shoots, sub-opposite lower down, shortly petiolate, the young ones downy beneath. *h.* 5ft. to 10ft. Europe (Britain), &c. See Fig. 361. (F. D. v. 850; Sy. En. B. 318.)

R. croceus (yellow). *fl.* greenish, in axillary clusters, pentandrous; petals wanting. May. *fr.* greenish or yellowish. *l.* coriaceous, roundish-obovate, about ¼in. long, lucid; when dry, of a bright yellowish-brown beneath. *h.* 4ft. California, 1848. A much-branched, thorny, evergreen shrub. (J. H. S. vi., p. 217.)

R. davuricus (Dahurian). *fl.* greenish-yellow, four-parted, numerous, fascicled in the axils. May. *l.* glabrous, fascicled at the ends of the exceedingly congested branchlets, ⅜in. to 2½in. long, obovate, acuminate, to narrow elliptic-lanceolate. Spines terminating the divaricating branches. *h.* 15ft. to 20ft. China, Eastern Siberia, &c., 1817. Tree or shrub. SYN. *R. utilis*.

Rhamnus—*continued.*

R. d. hirsutus (hairy). *l.* 2in. long. A large shrub or small tree.

R. Frangula (Frangula). Berry-bearing Alder. *fl.* greenish-white, five-parted, few, axillary. May and June. *fr.* black, ¼in. in diameter, globose. *l.* obovate, quite entire, alternate; stipules

FIG. 362. FLOWERING AND FRUITING TWIGS OF RHAMNUS FRANGULA.

subulate. Branches slender, unarmed. *h.* 5ft. to 10ft. Europe (Britain), &c. The wood, called Black Dogwood, is used by gunpowder-makers. See Fig. 362. (Sy. En. B. 319.)

R. latifolius (broad-leaved). *fl.* greenish, hermaphrodite; calyx villous, four-parted; stigma slightly three-cleft. July. *l.* elliptic, acuminate, quite entire, lined with twelve or fifteen lateral nerves; younger ones villous. *h.* 5ft. Azores, 1778. (B. M. 2663; W. D. B. i. 11.)

R. libanoticus (Lebanon). *fl.* yellowish, fasciculate. May. *l.* clustered at the tips of the branchlets, slightly tomentose, shortly petiolate, ovate or oblong, obtuse, rounded at base, margin finely denticulate. Branches clothed with whitish bark. *h.* 6ft. Asia Minor and Syria, 1879. Plant unarmed. The foliage turns a dull bronzy-purple in autumn. (B. M. 6721.)

R. macrophyllus (large-leaved). *fr.* black. *l.* 5in. to 6in. long. 2½in. to 3in. broad, coriaceous, dark green and shining above, pale and strongly veined beneath; petioles purplish. China (?), 1876.

R. oleifolius (Olive-leaved). A synonym of *R. californicus*.

R. robustus (strong). *fl.* green, small. May. *fr.* black, globose, ½in. in diameter. *l.* broadly ovate-lanceolate, convex, 7in. to 8in. long, 3in. to 3½in. broad, coriaceous, dark green. *h.* 18ft. 1879. A very vigorous tree.

R. utilis (useful). A synonym of *R. davuricus*.

RHAPHIDOPHORA (from *rhaphidos*, a needle, and *phero*, to bear; alluding to the needle-like hairs which abound in the intercellular spaces in all parts of the plants). SYN. *Raphidophora*. ORD. *Aroideæ* (*Araceæ*). A genus comprising about thirty species of slender or robust, climbing, stove shrubs, with very long, rooting branches, natives of tropical Asia, the Malayan Archipelago, Australia, and the Pacific Islands, with a few African. Flowers dense, on a sessile, inappendiculate, usually hermaphrodite, thick, cylindrical spadix; spathe thick, boat-shaped, including the spadix, at first oblong and convolute, afterwards opening, often rostrate, marcescent, at length deciduous; peduncles terminal, solitary or many. Leaves distichous, unequilateral, often large, lanceolate or ovate-oblong, entire, perforated, or pinnatifid, rarely pinnatipartite; segments broad at base; petiole short or elongated, long-sheathed. The species described below are those best known to gardeners. A compost of rich loam and fibrous peat, in equal parts, is admirably suited for their culture. The plants should be placed in the border, near a wall or a dead stem of a tree, so that their climbing propensities may be encouraged. A moist atmosphere is essential to success. Propagation may be effected by seeds; or by cuttings, inserted in sandy loam and peat, under a hand glass, with bottom heat.

R. decursiva (decurrent). *fl.*, spathe yellowish, pale on the margins, very thick, longer than the petiole; spadix greyish-green, long and thick. *l.* oblong, unequally pinnatisect as far as the midrib; segments, on adult leaves, fifteen or more on each side, sub-equal, linear; petioles one-third shorter than the leaves. India, &c., 1859.

Rhaphidophora—*continued.*

R. lancifolia (lance-leaved). *fl.*, spathe apricot-coloured and green-spotted outside, salmon-colour within, 3in. to 4in. long, 2½in. to 3in. wide, ovate, acuminate, open; spadix white, cylindrical, erect, obtuse. *l.* lanceolate, cuspidate, 9in. to 10in. long, unequal-sided, dark shining green, glabrous. Stem cylindrical. Khasia and Sylhet, 1874. (G. C. 1874, ii. 612.)

P. Peepla (Peepla). *fl.*, spathe yellowish outside, reddish-yellow within, ovate-acuminate, shorter than the petiole; spadix yellowish. *l.* oblong or elliptic-oblong, rounded at base, or cuneate, with a long cuspidate-acuminate apex, acute. East Indies.

R. pertusa (perforated). *fl.*, spathe scarcely equalling the petiole, but exceeding the spadix. *l.* unequilateral, loosely cordate at base, shortly cuspidate at apex, entire, pertuse, or pinnatifid; petioles about a quarter shorter than the leaves. East Indies.

RHAPHIOLEPIS (from *rhaphis*, a needle, and *lepis*, a scale; alluding to the narrow, subulate bracts). Erroneously spelt *Raphiolepis*. Indian Hawthorn. ORD. *Rosaceæ*. A genus comprising about five species of interesting, hardy or half-hardy, evergreen shrubs or trees, natives of China and Japan, one being also found in the Sandwich Isles (?). Flowers white or red; calyx with an obconical or funnel-shaped tube and five deciduous, subulate lobes; petals five, clawed, oblong, acute; stamens many; inflorescence paniculate or corymbose; bracts subulate, deciduous. Berries pulpy. Leaves alternate, petiolate, coriaceous, entire or serrulate. The most suitable compost for these shrubs and trees is one of loam, peat, and sand. Ripened cuttings will readily root in sand, under a hand glass. Some of the species will stand our winters outside, if planted against a south wall, and covered with mats during severe weather. Those best known in gardens are described below.

R. indica (Indian). East Indian Hawthorn. *fl.* white or pink-tinted, the size of those of the Hawthorn, in short, terminal panicles. February to August. *l.* ovate or lanceolate. *h.* 4ft. China, 1806. Half-hardy shrub.

R. i. phæostemon (brown-stamened). *fl.*, petals white; filaments brown. *l.* lanceolate, acuminated at both ends. 1820. (B. R. 468, under name of *R. indica*.)

R. i. rubra (reddish). *fl.* reddish; petals lanceolate. *l.* ovate-lanceolate, acuminated at both ends. 1806. (B. R. 1400 and L. C. B. 3, under name of *R. rubra*.)

R. i. salicifolia (Willow-leaved). *fl.* white. *l.* long-lanceolate. 1821. (B. R. 652, under name of *R. salicifolia*.)

R. japonica integerrima (entire-leaved Japanese). *fl.* snow-white, odorous, ⅔in. in diameter; panicles terminal, erect, 2in. to 4in. high, densely clothed below with large, ciliated bracts. June. *l.* alternate and obscurely whorled, 2in. to 3in. long, broadly obovate, obtusely apiculate, dark green and shining above, paler below. Branches stout. Japan, 1865. Hardy shrub. (B. M. 5510.)

RHAPHITHAMNUS (from *rhapis*, a needle, and *thamnos*, a shrub; on account of the spiny character of some of the species). SYN. *Pæppigia* (of Bertero). ORD. *Verbenaceæ*. A small genus (six species) of unarmed or spiny shrubs or trees, all natives of Chili. Flowers nodding, at the axils of minute bracts; calyx tubular-campanulate, shortly five-toothed; corolla tube straight, enlarged above, the limb spreading, of four or five unequal lobes; stamens four, didynamous; racemes axillary, few (often one or two) flowered. Leaves opposite, rather small, ovate, entire. Only two species have been introduced. For culture, *see* **Myrtus.**

R. cyanocarpus (blue-fruited). *fl.* pale blue, solitary or in pairs, shortly stalked; corolla tubular, ½in. long. Summer. *l.* broadly ovate and acute or orbicular and mucronate, very coriaceous, bright deep green above, pale beneath. *h.* 15ft. to 20ft. A densely leafy greenhouse tree, hardy in the Channel Islands and South-west England. (B. M. 6849.)

RHAPIDOPHYLLUM (from *Rhapis*, and *phyllon*, a leaf; in reference to its resemblance to the genus *Rhapis*, both producing suckers freely—a character by no means common in the Palm family). ORD. *Palmæ*. A monotypic genus. The species is a low, greenhouse palm, with a short, erect or creeping trunk. For culture, *see* **Chamærops.**

Rhapidophyllum—*continued.*

R. Hystrix (porcupine). Blue Palmetto. *fl.* yellow, minute; spathes about four, oblong, woolly, acutely two-lipped; spadix small, short-peduncled. June and July. *fr.* a small drupe. *l.* 3ft. to 4ft. high, circular in outline, deeply and unequally plicate, and cut into numerous two to four-toothed divisions, silvery beneath, on triangular, rough-edged petioles; sheaths persistent, composed of oblique fibres interwoven with numerous strong, erect spines. Trunk 3ft. to 4ft. long. Southern United States, 1801. SYN. *Chamærops Hystrix* (I. H. 1883, 486).

RHAPIS (from *rhapis*, a needle; alluding to the needle-like segments of the leaves). ORD. *Palmæ*. A genus comprising four or five species of low, Chinese and Japanese, greenhouse palms, with long, densely-tufted, reed-like, leafy caudices. Flowers yellowish; spathes two or three, incomplete, membranous; spadices shorter than the leaves, borne on slender peduncles, the branches spreading. Fruit consisting of one to three small, obovoid, one-seeded carpels. Leaves alternate and terminal, sub-membranous, connate or semi-orbicular, deeply cut into three to many segments, which are linear, cuneate, or elliptic, truncate, entire, toothed, or cut, three to many-nerved; petioles slender, biconvex, with smooth or serrulated margins; sheaths split into a fibrous network. Several of the species have been introduced, for culture of which *see* **Chamærops.**

R. aspera (rough). A synonym of *R. flabelliformis*.

R. cochinchinensis (Cochin China). *fl.*, spadix short, branched. *fr.* ovate, not edible. *l.* fan-shaped, palmately divided; segments oblong, obtuse, much plaited; petioles short, straight, prickly. Caudex 8ft. high. Cochin China.

FIG. 363. RHAPIS FLABELLIFORMIS.

R. flabelliformis (fan-leaved).* Ground Rattan Cane. *fl.*, males yellowish, sessile, thickly covering the spikelets; spadix sparse, paniculate-branched, 4in. to 5in. long. *l.* petioled, five to seven-

Rhapis—*continued.*

parted; segments sub-plicate, ciliate-spinulose along the edges and keel of the plaits, indented-erose at the end; petioles round-ancipital, naked, very obscurely denticulate. Stem about 1½ft. high, as thick as the thumb, sheathed by the reticulated, persistent bases of the leaves. China and Japan, 1774. See Fig. 363. (B. M. 1374.) SYN. *R. aspera*.

R. f. foliis-variegatis (variegated-leaved). A form in which the leaf-segments are more or less freely striped with white. Japan, 1861.

R. humilis (low-growing). *l.* cut into from seven to ten spreading segments; petioles unarmed. Similar in general aspect to *R. flabelliformis*. Japan. SYN. *R. Sirotsik* (of gardens).

R. Sirotsik (Sirotsik). A garden synonym of *R. humilis*.

RHAPONTICUM (from *Rha*, the old Greek name for Rhubarb, and *Ponticus*, of Pontus. It was also called *Rheum barbarum*. *See* **Rheum**). ORD. *Compositæ*. A genus comprising about half-a-dozen species of annual or perennial herbs, of which the best known is described below. *Rhaponticum* is included, by Bentham and Hooker, under **Centaurea** (which *see* for culture).

R. scariosum (scarious). *fl.-heads* purple; outer involucral scales all scarious, sub-entire or at length cut; inner ones narrower and very acuminate. July. *l.* glabrous above, cano-tomentose beneath; lower ones petiolate, ovate or cordate, denticulate; middle ones shortly petiolate, ovate-oblong; uppermost ones sessile, oblong, acuminate at both ends, scarcely toothed. *h.* 2½ft. Switzerland, &c., 1640. (B. M. 1752, under name of *Centaurea Rhapontica*.)

RHATANY ROOT. The root of **Krameria triandra** (which *see*).

RHEA. A common name for *Bœhmeria nivea*.

RHEEDIA (called after Hen. van Rheede, 1635-1691, a Dutchman residing at Malabar, author of "Hortus Malabaricus"). ORD. *Guttiferæ*. A genus embracing nineteen species of stove trees, inhabiting Madagascar and tropical Africa and America. Flowers usually rather small; sepals two; petals four; peduncles axillary or lateral, one-flowered. Leaves rigidly coriaceous, slenderly penniveined. The species are of little or no horticultural interest.

RHEUM (from *rheon*, an adjective formed from *Rha*, the old Greek name for Rhubarb. *Rheon barbarum* has been corrupted into our Rhubarb). Rhubarb. ORD. *Polygoneæ*. About a score species have been referred to this genus, but the number may be reduced; they are hardy, robust, perennial herbs, with thick and slightly woody rhizomes, natives of Siberian, Himalayan, and Eastern Asia. Flowers pedicellate, fasciculate, ebracteolate, the fascicles disposed in narrow, paniculate racemes; perianth of six spreading segments. Leaves large, sinuate-toothed or palmately lobed, three to eight-nerved at base. *R. Rhaponticum* and its varieties, and *R. undulatum*, furnish the rhubarb so well-known and extensively employed. Several of the species are very handsome, both in their foliage and in their inflorescence. The rhubarb of commerce, an important medicine, valuable for its mild purgative properties, is afforded by several species of *Rheum*, of which the following are the principal: 1. *R. palmatum*, first found wild in 1872-3, by Colonel Prejavalsky, in the Tangut district of Kansu, the extreme north-western province of China; this is the real source of the Russian, or Turkey, Rhubarb. 2. *R. officinale*, from the Chinese frontier of Eastern Thibet. 3. *R. Rhaponticum*, generally called English Rhubarb, a native of Southern Siberia, known to have been cultivated, early in the seventeenth century, at Padua, whence it was brought to England, the first plant being raised about the year 1628. It is largely cultivated at Bodicott for medicinal purposes. A selection of the best-known species is given below. Any of them are well worthy of cultivation as hardy, fine-foliaged plants, for wild gardens, margins of shrubberies, &c. They succeed in almost any soil, but do best where it is rich, and of a good depth. Propagated by seeds, and by division. For culture of the well-known garden varieties, *see* **Rhubarb.**

Rheum—*continued.*

R. acuminatum (taper-pointed). *fl.* lurid-purple, bloody, or brownish-purple, ¼in. in diameter, spreading; panicle slightly branched. *l.* broadly cordate, with a deep sinus, long-acuminate, opaque above, puberulous below; petioles slender, concave above. Root slender, often many feet long. *h.* 3ft. Sikkim, 1837. (B. M 4877.)

R. australe (Southern). *fl.* in a long, racemiform, dense panicle; calyx purple. *l.* sub-orbicular, broadly cordate, obtuse, flat, 3in. to 4in. long, nearly 3in. broad; petioles 4in. long, slender, slightly terete, angulate-sulcate. Stem 6ft. to 10ft. high, leafy. Root fusiform, branched. Nepaul. (S. B. F. G. 269.)

R. Emodi (Emodus). *fl.* whitish, in a fastigiate, dense panicle. *l.* broad-ovate, obtuse, cordate, with slightly wavy margins, five to seven-nerved; petioles semi-terete. Stem tall, leafy. *h.* 6ft. to 10ft. Himalaya.

R. nobile (noble).* *fl.* green, insignificant, in short, branched panicles; bracts delicate straw-colour, shining, semi-transparent, concave, imbricating, concealing the flowers, the upper ones with pink edges. *l.*, radical ones large, bright glossy green, with red petioles and nerves; stipules pink, fragile. *h.* upwards of 3ft. Roots thick, fleshy, sometimes many feet long. Sikkim. A lovely species. (G. C. n. s., iii. 91.)

R. officinale (officinal).* *fl.* greenish, small, collected into dense spikes. *l.* large, somewhat orbicular-reniform, five-nerved, and cut into five short lobes at the margin; lobes unequally incised. Stem 8ft. to 10ft. high, leafy and much-branched. Thibet, 1871. A stately plant. (B. M. 6135; B. M. Pl. 213; R. H. 1874, 13.)

R. palmatum (palmate-leaved). *fl.* in a leafy panicle. *l.* sub-orbicular-cordate, palmately lobed, slightly scabrous or glabrous above, three to five-nerved; lobes ovate-oblong or lanceolate, acute, undivided, or incised-toothed or pinnatifid; petioles nearly cylindric. *h.* 5ft. East and North Asia, 1763. (B. M. Pl. 214.)

R. Rhaponticum (*Rha ponticum—i.e.*, Pontic Rha or Rheum, the name of the drug Rhubarb in the Latin medical writers—applied to the present species by the old botanists). Common cultivated Rhubarb. *fl.* densely disposed in a leafy, fastigiate panicle. *l.* sub-orbicular, profoundly cordate, undulated, five-nerved, glabrous above, puberulous below and on the veins; upper ones ovate or acuminate; footstalks long, thick, and fleshy, channelled above, and rounded at the edges. *h.* 4ft. 1573. (B. M. Pl. 215.)

FIG. 364. RHEUM UNDULATUM.

R. undulatum (undulated). *fl.* densely disposed in a fastigiate panicle, which is leafy below. *l.* ovate-cordate, undulated, five to seven-nerved, glabrous above, puberulous beneath; uppermost ones sub-sessile, two or three times longer than broad; petioles semi-terete, loosely channelled above, with rounded margins. Stem 4ft. to 5ft. high, smooth, green. Siberia, &c., 1734. See Fig. 364.

RHEUMATISM ROOT. A common name for *Jeffersonia diphylla.*

RHEXIA (from *rhexis,* a rupture; applied to this genus for no obvious reason). ORD. *Melastomaceæ.* A genus comprising about seven species of mostly hardy, pretty, erect herbs or sub-shrubs, natives of extra-tropical Eastern North America. Flowers variously coloured, solitary or cymose; calyx tube oblong, campanulate, or urceolate, the dilated limb of four triangular or subulate lobes; petals four, obovate; stamens eight. Leaves oblong, shortly petiolate, three-nerved, entire or bristly-serrulate. The species described below are all hardy herbs. They thrive best in a bed of peat, but are sometimes grown in pots of the same soil. Propagation may be readily effected by division. Some of the plants formerly placed under this genus are now included under **Pleroma** (which *see*).

R. ciliosa (hair-fringed).* *fl.* purple, 1in. to 1½in. in diameter; cyme few-flowered, leafy. July and August. *l.* rarely as much as 1in. long, ovate, bristly on the upper surface, three-ribbed. Stem simple, 1ft. to 1½ft. high, smooth, four-angled above. 1812. (S. B. F. G. 298.)

R. mariana (Maryland). *fl.* purple, 1½in. to 2in. wide, hairy externally; calyx mostly smooth. July to September. *l.* lanceolate, acute, short-petioled, bristly-serrate, three-ribbed. Stem 1ft. to 2ft. high, branched, terete or six-angled. 1759. Plant bristly. This species varies with narrower, often linear leaves, and smaller, whitish flowers. (L. B. C. 366; S. B. F. G. 41.)

R. virginica (Virginian).* Deer Grass; Meadow Beauty. *fl.* bright purple, cymose. July and August. *l.* ovate and ovate-lanceolate, barely acute, sessile, bristly-serrate, three to five-ribbed, the lowest rounded. Stem 6in. to 12in. high, four-angled, nearly simple. 1759. Plant bristly. (B. M. 968; Gn. ii. 294, 59; L. B. C. 840.)

RHINACANTHUS (from *rhis, rhinos,* the nose, and *Acanthus*; alluding to the curious shape of the Acanthus-like corolla). ORD. *Acanthaceæ.* A small genus (about four species) of stove, loosely branched, sometimes sub-scandent shrubs, natives of tropical and South Africa, Madagascar, the East Indies, and the Malayan Archipelago. Flowers few, at the axils of the bracts, subsessile, sometimes fascicled or cymose and paniculate; calyx deeply five-cut, with narrow segments; corolla with an elongated tube and a bilabiate limb, the dorsal lip bidentate, the anterior one trifid; stamens two, affixed to the throat of the corolla. Leaves entire. The best-known species is described below. For culture, *see* **Justicia.**

R. communis (common). Ringworm Root. *fl.* white; upper lip linear, straight; panicle axillary or terminal, bi- or trichotomously spreading. June. *l.* oblong or ovate-oblong. *h.* 2ft. East Indies, 1790. (B. M. 325, under name of *Justicia nasuta.*)

RHINANTHACEÆ. Included under *Scrophularineæ.*

RHINANTHUS (from *rhis, rhinos,* the nose, and *anthos,* a flower; alluding to the form of the corolla). Yellow Rattle. SYN. *Alectorolophus.* ORD. *Scrophularineæ.* A genus comprising two or three very variable, erect, hardy annuals, natives of Europe, temperate and North Asia, and North America. Flowers sessile in the axils of the floral leaves, ebracteolate, upper ones spicate; calyx four-toothed; corolla yellow, violet, or blue, often spotted, with a bilabiate limb, the upper lip entire, the lower one of three spreading lobes. Leaves opposite; cauline ones crenate; floral ones often incised-toothed, with the teeth setaceo-cuspidate. The species are more or less parasitic on the roots of grasses, and thrive in any moist situation: they may be propagated by seeds.

R. Crista-galli (Cock's-spur). Penny-grass; Yellow Rattle, &c. *fl.*, corolla yellow, the upper lip blue. May to July. *l.* distant, 1in. to 2in. long, oblong-lanceolate or linear-oblong, obtuse or acute, deeply crenate-serrate. Stem 6in. to 18in. high, erect, simple or branched. Europe (Britain). (Sy. En. B. 998, under name of *R. minor.*)

R. major (greater). *fl.* orange-yellow; corolla tube longer than the glabrous calyx segments; lobes of the upper lip longer than broad; lower lip shorter than the upper. Late summer and autumn. *l.* opposite, sessile, deeply serrated. Stem usually copiously paniculate-branched. *h.* 6in. to 18in. Europe (Britain). (Sy. En. B. 999.)

RHINE-BERRY. A common name for *Rhamnus catharticus.*

RHINOPETALUM. Included under *Fritillaria.*

RHIPIDODENDRON. Included under *Aloe.*

RHIPIDOPTERIS. Included under **Acrostichum** (which *see*).

RHIPOGONUM (from *rhips,* a rod, and *gonu,* a knee or joint; in allusion to the jointed stalk). Sometimes spelt *Ripogonum.* ORD. *Liliaceæ.* A small genus (five species) of tall, climbing, greenhouse shrubs, of which one is a native of New Zealand, and the rest are Australian. Flowers rather small, shortly pedicellate or sub-sessile, racemose or spicate; perianth segments distinct, equal, or the outer ones shorter. Leaves often mostly opposite, sometimes all alternate, three to five-nerved, with reticulated veinlets; petioles not cirrhiferous. The species are little known in cultivation. *R. album* requires culture similar to **Myrsiphyllum** (which *see*).

R. album (white). *fl.* white, rather distant, in axillary, simple racemes, usually shorter than the leaves. June and July. *fr.* red when fresh, drying black, ¼in. in diameter. *l.* irregularly opposite or alternate, elliptic or oblong, varying to ovate or almost lanceolate, shortly acuminate, narrowed at base, mostly 3in. to 4in. long. Main branches often prickly. Australia, 1820.

RHIPSALIS (from *rhips,* a Willow-branch; referring to the flexibility of the branches). Including *Lepismium* and *Pfeiffera.* ORD. *Cacteæ.* A genus of greenhouse, succulent shrubs, with sub-radicant, elongated, terete, or leafy-dilated and crenate stems. Thirty species have been described, natives of tropical America, one being found in South Africa, and one in Mauritius and Ceylon. Flowers lateral, rarely terminal; calyx tube not produced above the ovary, with three to many very

FIG. 365. FLOWERING BRANCH OF RHIPSALIS FUNALIS.

short, scale-like lobes; petals six to ten, spreading, oblong; stamens numerous. Berry sub-globose, smooth. Leaves scale-like. The species best known in gardens are described below. They should be grown in a compost of sandy loam, leaf mould, and brick rubbish. Propagation may be effected by cuttings, inserted in rough

Rhipsalis—*continued.*

gravel or brick rubbish, after having been dried at the base for a few days.

R. brachiata (forked). A synonym of *R. Saglionis.*

R. Cassytha (Cassytha).* *fl.* abundant on the sides of the branchlets, often crowded; calyx teeth five or six; petals five or six, greenish-white; stamens twelve to fourteen. September. *fr.*, berry waxy-white, like that of the Mistletoe. Stems slender, terete, firm, branched, in dense whorls, the branches again branched; joints rare, except at the branching. *h.* 1ft. Tropics, &c., 1758. (B. M. 3080.)

R. communis (common). *fl.* rose, white; crenæ furnished with an ovate acute scale and numerous white hairs. Summer to December. Plant articulated, erect, sub-radicant, pale green, triangular; ribs much compressed, repandly crenated. Brazil, 1836. (B. M. 3763, under name of *Lepismium commune.*)

R. crispata (curled). *fl.* white, minute, scarcely odorous; petals six, ovate, reflexed; stamens numerous. December. *fr.*, berry white, globose. Plant sub-erect, articulated; branches orbicular or oblong, sub-petiolate, yellowish-green, almost membranous, deeply crenate, the margins slightly curled. *h.* 1ft. Native place unknown.

R. fasciculata (cluster-branched). *fl.* similar to those of *R. Cassytha*, but smaller; petals five, dirty-yellow. *fr.*, berry white, crowned with the remains of the corolla. Plant creeping, branched; branches fascicled, green, terete, very sparsely setose; young ones spirally sub-angular; areolæ slightly clustered. Brazil. (B. M. 3079.)

R. funalis (cord-like). *fl.* white, very copious, ten lines in diameter, inodorous; petals seven or eight; stamens very numerous; February to April. Trunk 2ft. to 3ft. high, at length woody; branches long, terete, obtuse; areolæ scattered, almost naked. Central America. See Fig. 365. SYN. *R. grandiflora* (B. M. 2740).

R. grandiflora (large-flowered). A synonym of *R. funalis.*

R. Houlletii (Houllet's).* *fl.* straw-colour, copiously produced in the axils of the marginal teeth. Branches pendulous; the articulations 3in. to 6in. long, elliptic-lanceolate, coarsely toothed, and of a glabrous-green, with a faint tinge of brownish-purple along the margins. Brazil, 1874. (B. M. 6089.)

R. mesembryanthemoides (Mesembryanthemum-like). *fl.* white, ¼in. across at the lateral joints; petals five, much-spreading. Spring. *fr.*, berry white. Plant glomerately branched; branches 8in. to 10in. long, sub-erect, terete, bearing rooting joints; lateral joints clustered, terete, attenuated at both ends; fascicles of spines pale white, dying off blackish. Tropical America, 1817. (B. M. 3078.)

R. pachyptera (thick-winged). *fl.* numerous upon the joints, solitary in each crenature; calyx leaflets three, brownish; petals five, pale yellowish-green. November. Plant 1ft. to 2ft. high, proliferously jointed and branched; joints 4in. to 6in. long, oblong, remarkably compressed, 1in. to 3in. broad, the margins slightly thickened, crenate-lobed, glabrous; lateral thickened nerves leading off from the distinct midrib, curving upwards to the crenatures. Brazil. (B. M. 2820, under name of *Cactus alatus.*)

R. paradoxa (paradoxical). *fl.* yellow, white; crenæ remote, furnished with white hairs, and propped by leafy bracts. August to November. Plant diffusely sub-erect, sub-articulated; joints elongated, slender, three or four-sided; margins acute, crenulated, purple. Brazil, 1837. (B. M. 3755, under name of *Lepismium Myosurus.*)

R. penduliflora (pendulous-flowered). This is closely allied to *R. Saglionis*; it differs in its pendulous habit, fastigiate and quite terete branches, and pendulous flowers with more obtuse petals. Tropical America, 1877.

R. pentaptera (five-winged). *fl.* white, ½in. across, very copious in the crenatures of the branches and on the upper part of the trunk; petals six or seven, biseriate. February and March. Plant sub-erect, 1½ft. high, long-jointed, full green; main stem five or six-angled, with slender, slightly twisted, five-angled branches; areolæ remote. Brazil.

R. rhombea (diamond-branched). *fl.* greenish-white, solitary, small. Stem terete or variously compressed, and, as well as the branches, sub-erect, articulated, diffuse; joints 1in. to 3in. long, with filiform wings, ovate- or lanceolate-rhomboid, highly glabrous, and shining, incised-crenate at the margins. Brazil. (Ref. B. 152.)

R. Saglionis (Saglio's). *fl.* greenish-yellow, rather large, terminal upon divaricate articulations, on the lower part of the stem. *h.* 8in. to 10in. Plant erect or nearly so; main stem cylindrical, bearing the few scattered flowering branches below, and above many horizontal branches, which are again divided, always opposite, brachiate, and with more numerous and shorter joints as they come nearer the ultimate divisions. Buenos Ayres. SYN. *R. brachiata* (B. M. 4039).

R. salicornoides (Glasswort-like).* *fl.* yellow, terminal, solitary or in pairs; corolla superior; petals numerous, thin, concave, never opening wide. Spring. Plant trailing (young specimens erect), proliferous; branches very numerous, spreading, jointed; joints club-shaped, rounded, tubercled, smooth, scarred, glaucous; older stems grey. Brazil. (B. M. 2461; G. C. n. s., v. 731.)

Rhipsalis—*continued.*

R. sarmentacea (twiggy-stemmed). *fl.* white. Stem slender, creeping, rooting, slightly branched, obtuse-angled; areolæ clustered, minute, prickly, slightly tomentose; prickles eight to twelve, very slender, bristly, unequal, snow-white. Bonaria, 1858. (B. M. 5136.)

R. Swartziana (Swartz's). *fl.* whitish, minute. June. *fr.*, berry nearly black. Stem 1ft. to 2ft. high, simply branched, winged above; summit resembling the branches. Branches 6in. to 12in. long, alternate, flat, oblong or oblong-linear, remotely crenate, tapering at the stipitate, jointed base. Jamaica, 1810.

RHIZANTHOUS. Flowering from the root, or apparently so.

RHIZOBIINÆ. A group of Aphides, which derive their name (meaning "root-livers") from living underground upon roots of various plants. In this group all the species exhibit this habit; but so also do various genera outside the *Rhizobiinæ*, strictly so-called, *e.g.*, most species of *Paracletus*, *Schizoneura*, and *Trama*, and a few species of the genera *Aphis*, *Phylloxera*, *Pemphigus*, and *Siphonophora*. In all the above genera there are species more or less hurtful to garden plants, by feeding on their roots, and thereby weakening them; and several of the species have been referred to the genus *Rhizobius* because of their mode of life—*e.g.*, *Trama radices*, described by Westwood, under the name *Rhizobius Helianthemi*. A very large part of the root-feeding Aphides select roots of grasses; but they also feed largely on Lettuces (*Pemphigus*), Jerusalem Artichokes, French Beans, and Scarlet Runners (*Tychea Phaseoli*, &c.). A curious circumstance connected with these insects is the relation that exists between them and certain species of ants, in whose nests they usually remain; in the nests they are carefully attended to by the ants. In the genus *Rhizobius* no winged forms are known, nor do honey-tubes exist. Owing to their mode of life, it is difficult to free plants when once attacked by these subterranean Aphides. Probably, the best means is to water them with a solution of gas-water or gas-lime, or of carbolic acid; or to make use of carbon disulphide, poured into holes in the soil near the roots.

RHIZOBOLEÆ. Included under *Ternströmiaceæ.*

RHIZOBOLUS. A synonym of *Caryocar.*

RHIZOCARPOUS. Literally, root-fruited; having a perennial root, but a stem which perishes annually.

RHIZOGLOSSUM. Included under *Ophioglossum.*

RHIZOID. Resembling a root.

RHIZOME. "A rootstock; a stem of root-like appearance, prostrate on or under ground, from which rootlets are sent off; the apex progressively sending up herbaceous stems or flowering stalks, and often leaves" (Asa Gray).

RHIZOMORPHOUS. Having the appearance of a root.

RHIZOPHORA (from *rhiza*, a root, and *phoreo*, to bear; the branches emit roots freely, and these descend into the mud in which the tree grows). Mangrove. ORD. *Rhizophoreæ.* A genus comprising two (or four or five) species of stove trees, inhabiting tropical shores and mud swamps. Flowers rather large, sessile or pedicellate, on axillary, bi- or trichotomously branched peduncles. Leaves opposite, petiolate, thickly coriaceous, ovate or elliptic, entire, glabrous. "In the economy of Nature, the Mangrove performs a most important part, wresting annually fresh portions of the land from the dominion of the ocean, and adding them to the domain of man. This is effected in a twofold manner: by the progressive advance of their roots, and by the aërial germination of their seeds, which do not quit their lofty cradle till they have assumed the form of actual trees, and drop into the water with their roots ready prepared

Rhizophora—*continued.*

to take possession of the mud, in advance of their parent stems" (Dr. Wm. Hamilton, in the "Pharmaceutical Journal"). *R. Mangle* has been introduced to this country, but is difficult to cultivate.

RHIZOPHOREÆ. A natural order of usually quite glabrous trees and shrubs, with terete branchlets swollen at the nodes, almost wholly tropical, and to a great extent littoral. Flowers usually hermaphrodite, axillary, disposed in cymes, panicles, spikes, or racemes, rarely densely clustered or solitary, small or rather large, bibracteolate or ebracteolate; calyx tube more or less adnate to the ovary, rarely free; limb three to fourteen-lobed or entire, persistent; petals as many as the calyx lobes, usually small, concave or involute, and embracing the stamens, notched, bifid, or lacerate, rarely entire, convolute or inflexed in bud; stamens twice, or three or four times, as many as the petals, rarely equal in number; ovary usually inferior, two to five (rarely six) celled. Fruit usually coriaceous, crowned with the calyx limb, indehiscent or rarely septicidal, one-celled and one-seeded, or with two to five one-seeded cells. Leaves opposite and stipulate, rarely alternate and exstipulate, petioled, thickly coriaceous, usually quite entire, in a few cases sinuate-crenulate or serrulated; stipules interpetiolar, very caducous. The wood of *Rhizophora Mangle* is described as edible, and when fermented produces a light wine. The order comprises seventeen genera, and about fifty species, none of which are of horticultural value. Examples: *Haplopetalum, Rhizophora.*

RHIZOS. This term, used in Greek compounds, signifies a root; *e.g.*, *Rhizophora.*

RHODAMNIA (from *rhodamnus*, a small branch; in reference to the size of the plants). SYN. *Monoxora.* ORD. *Myrtaceæ.* A genus of stove or greenhouse shrubs or small trees. Twelve species have been enumerated; of these, three are natives of Eastern or tropical Australia, and the rest of tropical Asia. Flowers often small; calyx tube ovoid or sub-globose; limb of four persistent lobes or segments; petals four, spreading; pedicels short, sometimes very short, fasciculate in the axils, or shortly and loosely racemose; bracteoles small, caducous. Leaves opposite, ovate or lanceolate, three-nerved or triplinerved, often hoary or downy beneath. The only species introduced is often erroneously classed under *Eugenia.* For culture, *see* **Myrtus.**

R. trinervia (three-nerved). *fl.* white; peduncles slender, axillary, three together in a cluster, or on a short, common peduncle, each with one or rarely three flowers. May. *l.* ovate-oblong or ovate-lanceolate, acuminate, glabrous and much reticulated above, prominently three-nerved from the base, beneath, as well as on the young shoots and inflorescence, velvety-pubescent. Australia, 1823. A tall greenhouse shrub or small tree. (B. M. 3223, under name of *Eugenia trinervia.*)

RHODANTHE. Included under **Helipterum** (which *see*).

RHODIOLA. Included under **Sedum** (which *see*).

RHODITES. A genus of Gall-flies (*Cynipidæ*), all the known species of which, viz., six European and four American, make galls on Roses, but on no other plants, with the exception of *R. radicum*, one of the American forms, which is said also to gall the roots of Raspberries, and of Blackberries or Brambles.

R. Rosæ produces the well-known Bedeguar Gall on various kinds of Roses; *R. spinosissimæ* makes galls of very varied form on twigs, leaves, and fruits of *Rosa spinosissima* and *R. canina*; *R. Eglanteriæ* makes smooth, round galls, like small peas, on leaves of *Rosa canina* and *R. rubiginosa*; *R. centifoliæ* makes similar galls on *Rosa centifolia*; *R. rosarum* causes the growth of small, round leaf-galls, each decked with a few long prickles, on various kinds of Roses; and *R. Mayri* forms galls on leaves and branches of *Rosa canina.* All the

Rhodites—*continued.*

above are natives of Europe. For further information, *see* **Rose-galls.**

RHODO. This term, used in Greek compounds, signifies red; *e.g.*, *Rhodochiton, Rhodostachys.*

RHODOCHITON (from *rhodo*, red, and *chiton*, a cloak; in reference to the large, coloured calyx). ORD. *Scrophularineæ.* A monotypic genus. The species is an elegant, greenhouse herb, with the petioles and peduncles usually twisted and climbing. For culture, *see* **Maurandya.**

R. volubile (twining).* *fl.* on axillary, elongated pedicels; calyx pale reddish, ample, broadly campanulate, semi-five-fid; corolla dark blood-colour, rather large, with five erecto-patent lobes. June. *l.* alternate, cordate, acuminate, with a few acute teeth, sparsely glandular-puberulous. *h.* 10ft. Mexico, 1833. (B. M. 3367; B. R. 1755; S. B. F. G. ser. ii. 250.)

RHODOCISTUS BERTHELOTIANUS. A synonym of **Cistus candidissimus** (which *see*).

RHODOCOMA. A synonym of **Restio** (which *see*).

RHODODENDRON (an old Greek name, from *rhodos*, a rose, and *dendron*, a tree; in allusion to the rose-red flowers of many of the species). Rose Bay. *Azalea* and *Rhodora* are merged, by the authors of the "Genera Plantarum," into this genus, but for garden purposes they have been kept distinct in this work. ORD. *Ericaceæ.* A large and popular genus of highly ornamental, glabrous, pubescent, tomentose, or lepidoted, stove, greenhouse, or hardy shrubs, rarely trees. The species, which number upwards of 100, are natives of the mountains of Europe, Asia, the Malayan Archipelago, and North America, often gregarious, being copiously found on the Himalayan mountains. Flowers usually large, often disposed in terminal, many or few-flowered, sometimes subracemose corymbs, rarely axillary or solitary; calyx variable, five-sepaled, five-toothed, patelliform, cup-shaped, or obsolete, coriaceous or leaf-like, persistent; corolla variable, often funnel-shaped or bell-shaped, rarely tubular, salver-shaped, or sub-rotate; limb more or less oblique, five (rarely six to ten) lobed or rarely parted, very rarely sub-bilabiate, the lobes imbricated; stamens eight to ten, rarely five or twelve to eighteen, more or less unequal, sometimes spreading; filaments subulate-filiform or short and thick, usually pilose or bearded at the base. Capsules short or elongated, woody, five to twenty-celled. Leaves alternate, often clustered at the tips of the branchlets, entire, coriaceous, rarely membranous, annual or biennial.

Rhododendrons may justly be classed amongst the most beautiful and attractive of evergreen, flowering shrubs. Their foliage is at all times attractive, and the flower-trusses, which vary much in size with the species or variety, are usually borne in the greatest profusion whenever the plants succeed. Amongst outdoor shrubs, none are more showy when in flower than the gorgeous varieties and hybrids raised from *R. ponticum.* This species itself has now been so generally superseded by varieties or hybrids, that it need no longer be grown extensively, except for covert planting, and for the supply of stocks whereon to graft the superior forms. Some of the grandest indoor plants, where space can be allowed them to develop, are specimens of the Himalayan species, many of which have flowers highly perfumed, in addition to their other good qualities. Of late years, numerous hybrids have been raised, by using, for crossing and inter-crossing, several of the species and hybrids which have been from time to time obtained. These are all beautiful, and well adapted for culture in small pots, for greenhouse decoration. They have always been much valued, and seem deservedly to be fast increasing in popularity.

Propagation. There are several methods by one or more of which the species, hybrids, and varieties of

Rhododendron—*continued.*

Rhododendron may be increased—namely, seeds, cuttings, and layers, and by grafting. Budding and inarching are also practicable. The seeds, which are very minute, require to be sown in thoroughly-drained pots, or shallow pans, of sandy peat. The top layer should have a little more sand intermixed than is necessary for the other portion, and should be passed through a fine sieve. After the surface has been rendered smooth and pressed firm, the pots, or pans, should be watered previous to sowing, and then allowed to drain. Scatter the seeds thinly over the top, press in, and cover very lightly with a little silver sand. To prevent the soil from drying too readily, the plan of placing a little moss over the soil is often practised; this must not be allowed to remain after the seeds begin to germinate. The pans may be placed in gentle heat, or in a cold frame; and shading from sunshine is necessary. February and March are the best seasons for sowing. When the plants come up, and are large enough to handle, they should be pricked off in pans of soil similar to that in which they have previously been growing, and be kept shaded and close until re-established. Afterwards, they may gradually have air and light admitted to harden them. Cuttings intended for propagating should be made of partially-ripened wood, inserted in sandy peat, and kept close and shaded. After they have callused, a slightly higher temperature may be allowed than at first, such as a gentle hotbed affords. Layering may be practised in autumn or spring, when the parent plant is sufficiently dwarf to allow of its being done. Roots proceed from almost any part of the firm wood near the base, but only very slowly indeed. Grafting is one of the principal methods adopted for increasing established varieties of *Rhododendron*, the stocks used being procured from seedlings or cuttings obtained from medium or strong-growing common varieties or species of good constitution. Grafting is most extensively practised towards the latter part of summer, when the scions have become ripened; with the tender indoor species, it is best done in winter. Grafted plants require to be kept for a time in close frames until a union has been effected.

Culture of Indoor Greenhouse Rhododendrons. Many of these develop into very large bushes, where space can be afforded, and provision made for planting them out. Amongst the species may be specially mentioned the magnificent *R. Nuttallii*, also *R. arboreum*, *R. Aucklandii*, *R. Edgeworthii*, &c. An open, peaty soil suits best, and good drainage is essential, as large quantities of water are requisite in summer. Unless seeds are required, the whole of the seed-vessels should be carefully removed when flowering is over, and the plants should then, if possible, be kept rather close while making their annual growth. Specimens of the species above-named may also be grown successfully in large tubs or pots, as the root space required is not really so much as the size of head would suggest. All the beautiful hybrid greenhouse Rhododendrons are most desirable subjects for decorative purposes in cool houses. They are mostly free-growing, and exceptionally free-flowering, as, by affording what is known as a warm greenhouse temperature, some of the plants in a collection are nearly always to be seen in flower. Especially are these remarks applicable to the section raised from *R. jasminiflorum*, *R. javanicum*, &c., which require more heat in winter than *R. ciliatum*, *R. Edgeworthii*, and others mentioned above. The hybrids succeed in rather small pots; good turfy peat and some silver sand is the most suitable compost to use. The plants should be kept under glass, but subjected to plenty of air in summer after their annual growth has been made. Water must be very carefully administered, particularly after potting, or if signs of ill-health are apparent. Rain-water

Rhododendron—*continued.*

for these, as for all other hard-wooded plants, is much to be preferred to any other.

Culture of Hardy Outdoor Rhododendrons. Hardy Rhododendrons succeed under various conditions regarding situation and soil, but one thing is always fatal to the well-doing of most of them, namely, the presence of lime or chalk in the compost within reach of their roots. Naturally, they prefer a rather moist situation and partial shade, but these conditions are not absolutely necessary, as the plants are hardy enough to grow and flower splendidly where fully exposed to the sun. Peat and leaf soil are unquestionably best suited for Rhododendrons; but *R. ponticum* and its numerous beautiful varieties grow well where there is a good proportion of loam, provided the destructive ingredients already referred to are absent. It is generally necessary to have beds specially prepared for these plants, by taking out the ordinary soil and refilling with a prepared compost, If peat is procurable, it should form the bulk; leaf soil and sandy loam may be added more freely when they can be obtained more easily. Dried cow-manure is also a good addition. Prepared beds for Rhododendrons should, if possible, be from 2ft. to 2½ft. deep; it is far better to make them properly at first, and large plants require that depth, although they always root near the surface. Transplanting may best be performed in spring; but there are few shrubs that withstand it so well at any season, provided the balls are not kept long out of the ground, and watering is well attended to afterwards. Large standard specimens of the numerous beautiful hybrids are exceedingly telling in pleasure-grounds, either isolated or planted amongst other smaller plants of Rhododendrons, or such subjects as are usually grown with them, hardy Ericas, Kalmias, Pieris, &c. The *ponticum* hybrids form valuable forcing subjects; they may be lifted from the open ground after the flower buds are set, and potted up. If introduced to heat in early spring, the flowers soon expand, and showy specimens are thereby obtained early for greenhouse decoration.

R. ferrugineum and *R. hirsutum* are dwarf, free-flowering species, well adapted for planting in small beds by themselves, or in prepared borders in different parts of rock-gardens, &c. They are always dwarf and somewhat slow-growing, so that, if associated with the vigorous *ponticum* varieties, they are liable to become overgrown and smothered. All Rhododendrons have extremely small, fibre-like roots, which are disposed very close to, and even on, the surface of the soil. It is important that these be kept protected from the sun; if the foliage does not insure sufficient shade, a top-dressing of leaf soil, cocoanut-fibre refuse, or similar material, proves of great advantage through the summer time, when the roots require to be kept cool and moist.

The best-known species and varieties are described below. Except where otherwise indicated, all are shrubs, and require greenhouse treatment.

R. æruginosum (verdigris-coloured). A synonym of *R. campanulatum*.

R. albiflorum (white-flowered). *fl.* drooping, on fascicled, rarely solitary peduncles; calyx large, deeply cut into five brownish-green segments; corolla pure cream-white, twice as long as the calyx, rotate-campanulate, five-lobed; stamens ten, included. July. *l.* deciduous, elliptic-lanceolate, shortly petiolate, entire, glabrous, penninerved, 1in. to 1½in. long; stipules brown, early deciduous. Branches erect. *h.* 2ft. to 3ft. Rocky Mountains. Hardy. (B. M. 3670.)

R. album (white). *fl.* small, on pedicels 1in. to 1½in. long; calyx minute; corolla pale yellowish-white or cream-colour, broad-campanulate, its five lobes nearly equal, rounded, retuse; stamens ten; corymbs umbellate, terminal, shorter than the leaves. November. *l.* rather copious, spreading, 3in. to 4in. long, oblong-lanceolate, acute, on short, lepidoted petioles, glabrous and dark green above, thickly clothed with minute, ferruginous scales beneath. Branches clothed with reddish-brown bark. *h.* 1ft. Java. (B. M. 4972.)

R. Anthopogon (bearded-flowered).* *fl.* sulphur-coloured, glomerate; calyx with a short, five-lobed limb; corolla salver-shaped,

Rhododendron—*continued.*

with a woolly throat and a spreading limb of roundish, undulately-curled segments; stamens eight, inclosed. April and May. *l.* oval, rusty beneath from lepidoted tomentum, biennial, coriaceous, terminating in a reflexed mucrone. Branchlets downy. *h.* 1ft. to 1½ft. Central and Northern Asia, 1820. Hardy. (B. M. 3947.)

FIG. 366. FLOWERING BRANCHLET OF RHODODENDRON ARBOREUM.

R. arboreum (tree-like).* *fl.* white, rose, or blood-colour, disposed in dense heads; calyx absent; corolla campanulate; stamens ten. March to May. *l.* large, coriaceous, lanceolate, acute, cordate at base or attenuated into a thick petiole, of a beautiful green above, below impressed with netted veins, glabrous, silvery or ferruginous-pubescent. *h.* 20ft. to 25ft. Himalayas, 1820. A magnificent, half-hardy tree, sometimes attaining a circumference of 150ft. See Fig. 366. (P. M. B. i. 101; R. S. H. vi., under name of *R. Campelliæ*.) This species has been largely used for hybridising purposes; many of its progeny, however, are early-flowering, and liable to be injured by spring frosts. Some of them are mentioned herewith: *R. altaclerense* (B. M. 3423), *R. Russellianum* (S. B. F. G. ser. ii. 91), *R. Smithii* (S. B. F. G. ser. ii. 50), *R. undulatum* (S. B. F. G. ser. ii. 341), *R. venustum* (S. B. F. G. ser. ii. 288). The following are varieties:

R. a. album (white). *fl.* white, with some purple dots above on the inside. *l.* ferruginous beneath. (B. M. 3290; B. R. 1684.)

R. a. cinnamomeum (cinnamon-leaved). *fl.* white, with purple and yellow spots. *l.* cinnamon-coloured beneath. (B. R. 1982.)

R. a. c. roseum (rosy). A splendid sub-variety, having rose-coloured flowers 2½in. in diameter. (B. M. 3825.)

R. a. limbatum (bordered). *fl.*, corolla limb rose-colour, gradually fading into an almost pure white throat, marked at the base with a deep blood-red blotch, broad. Half-hardy. (B. M. 5311.)

R. a. puniceum (purple). *fl.* either purplish or of an intense red-scarlet colour; corolla segments sub-bilobed at apex, crenate, sub-undulated. *l.* covered below with velvety-silvery, adpressed pubescence. (B. R. 890 and H. E. F. 168, under name of *R. arboreum*.)

R. a. roseum (rosy). *fl.* rose-colour. *l.* ferruginous beneath. (B. R. 1240; S. B. F. G. ser. ii. 339.)

R. argenteum (silvery). A synonym of *R. grande*.

R. Aucklandii (Lord Auckland's).* *fl.* the largest of the genus; calyx platter-shaped, 1½in. in diameter; corolla firm, rather fleshy, pure white, tinged with pink, veiny; tube short, yellowish and rose-coloured towards the base; limb spreading, 3in. to 5in. in diameter; peduncles longer than the petioles, red or green. May. *l.* variable in size and breadth, 4in. to 10in. long, coriaceous, oblong-elliptical, scarcely approaching to lanceolate, acute, cordate at base, full green above, paler below; petioles 2in. long. Branches sub-erect, copiously leafy. *h.* 4ft. to 8ft. Sikkim, 1850. (R. S. H. xi.) SYN. *R. Griffithianum Aucklandii* (B. M. 5065).

R. barbatum (bearded). *fl.* deep puce or blood-colour, moderate-sized, collected into a compact, globose head, 4in. to 5in. in diameter; calyx large, scarcely silky, deeply cut into five leaf-like lobes ½in. long. *l.*, when young, sparingly hairy and ciliated; adults 5in. to 7in. long, 1½in. to 2in. or more wide, elliptic-lanceolate, acute, rather broader above the middle; margins reflexed and rough with hard ciliæ; petioles ½in. long, slightly tubercled, and beset with long, rigid, black setæ or hairs, which often extend a little way up the midrib beneath. Main trunks few, clothed with reddish bark; branches numerous. *h.* 40ft. to 60ft. Sikkim, 1829. Half-hardy tree. (F. d. S. 469; R. S. H. 3.)

R. b. Smithii (Smith's). A variety differing from the type in having the under surface of the leaves furfuraceous sub-tomentose. SYN. *R. Smithii* (B. M. 5120).

R. blandfordiæflorum (Blandfordia-flowered).* *fl.* often green before expansion, afterwards becoming more or less of a cinnabar or brick-red or orange-red on the upper part of the tube and limb, sometimes altogether green, at others red, even in the bud; corolla 1in. to 2½in. long; stamens ten; heads five to ten-flowered. *l.* 2in. to 3in. long, coriaceous in luxuriant plants, lanceolate, acuminate, shortly petiolate, ferruginously lepidoted beneath. Branchlets slender, twiggy, lepidoted. *h.* 8ft. Himalayas, 1851. (B. M. 4930.)

R. Boothii (Booth's). *fl.* yellow, campanulate, disposed in many-flowered corymbs; calyx leaf-like, membranous, the segments oval, obtuse, glabrous. *l.* thickly coriaceous, rhomboid, ovate, acuminate, 4in. to 5in. long, 2in. to 2½in. broad, scaly beneath, densely ciliated on the margins. *h.* 5ft. to 6ft. Bhotan. This is found growing as an epiphyte on Oak-trees in its native place. (I. H. 1858, 174.)

R. Brookeanum (Sir James Brooke's). *fl.* many, in a large, loose, terminal umbel, on rather short peduncles; calyx absent; corolla full orange or golden-tawny, between bell and funnel-shaped, large, thick, with an elongated tube and a limb of five crisped lobes; stamens ten, as long as the tube. April. *l.* 6in. to 9in. long, firm, oblong-lanceolate, acute, full green above, the same or a little paler beneath, and there sparingly dotted with minute scales; petioles dark purple, very short, broad, and thick. Branches dark purple, stout. Borneo, 1848. Stove epiphytal or terrestrial shrub. (B. M. 4935; F. d. S. v. 480; G. C. 1871, 236.)

R. B. gracilis (slender).* *fl.* pale yellow, freely produced on young plants in trusses of ten to twelve. *l.* light green, elliptic-lanceolate. 1871. (J. H. S. iii. 85.)

R. californicum (Californian). *fl.* many, in terminal umbels; calyx small, slightly pilose; corolla rose-purple, broadly campanulate, the lobes yellow-spotted within, and undulated; stamens ten, shorter than the corolla. June. *l.* somewhat obovate-elliptic, coriaceous, acute, glabrous, shortly petiolate, one-coloured, paler beneath. *h.* 3ft. to 8ft. California. Hardy. (B. M. 4863.)

R. calophyllum (beautiful-leaved).* *fl.* in corymbs of four or five, on short, scaly peduncles; calyx very scaly, short, five-lobed; corolla pure white, slightly tinged with yellow-green, 3in. long and broad, tubular-campanulate, somewhat ringent, deeply five-lobed; stamens eighteen to twenty, included. May. *l.* 3in. to 5in. long, firm, rigid, coriaceous, ovate, oblong, or somewhat elliptical, dark glossy-green, obtuse at base, very acute at apex, glaucous beneath when young, ferruginous when old, with innumerable scales. Branches spreading, stout, terete. *h.* 3ft. Bhotan. (B. M. 5002.)

R. camelliæflorum (Camellia-flowered). *fl.* solitary or twin, on short, curved peduncles; calyx segments thick, obtuse; corolla pure white, with a faint rosy tinge, rather thick, lepidoted, 1½in. across. April. *l.* at the tips of the branches, differing in little but size from those of *R. Maddeni*, 2½in. to 3in. long. Stems 2ft. to 6ft. long, seldom thicker than a goose-quill. Branches long, generally pendulous. Sikkim, 1851. (B. M. 4932; R. S. H. xxviii.)

R. campanulatum (bell-flowered).* *fl.* pale lilac, with a few purple spots, or rose-colour, corymbose; calyx lobes very short; corolla campanulate, about 2in. in diameter, with flat, entire lobes, rounded at the apex; pedicels glabrous. April. *l.* elliptic, mucronate, obtuse or sub-cordate at base, below greyish-powdery, above, as well as the petioles and branchlets, glabrous. *h.* 4ft. Sikkim, 1825. Half-hardy. (B. M. 3759; L. B. C. 1944; P. M. B. xvi. 193; S. B. F. G. ser. ii. 241.) SYN. *R. æruginosum* (R. S. H. xxii.).

R. c. æruginosum (verdigris-coloured). A form having the under surface of the leaves clothed with verdigris-coloured tomentum.

R. c. Batemani (Bateman's). A larger-flowered, more robust-habited form. (B. M. 5387.)

R. c. Wallichii (Wallich's). *fl.*, corolla more brightly coloured than in the type. *l.* elliptic or oblong, loosely tomentose beneath, often caducous; petioles densely woolly. (R. S. H. v.)

R. campylocarpum (curved-fruited).* *fl.* honey-scented, horizontal and nodding, six to eight in a terminal head, on slender pedicels; calyx five-lobed, glandulose; corolla tinged of a sulphur hue, and always spotless, truly campanulate, nearly 2in. long, broader across the five spreading lobes, which are finely veined. June. Capsules curling upwards. *l.* coriaceous, but not thick, 2in. to 3½in. long, 1½in. to 2in. broad, cordate at base, rounded and mucronate at the apex, on slender petioles ¾in. long. Ultimate branchlets, as well as the peduncles and pedicels, glandular-pilose. *h.* 6ft. Sikkim, 1851. A twiggy, branched bush. (B. M. 4968; R. S. H. xxx.)

R. catawbiense (Catawban). *fl.* lilac-purple; calyx lobes small; corolla broadly campanulate; pedicels (and capsule) rusty-pubescent. July. *l.* oval or oblong, rounded at both ends, smooth,

Rhododendron—*continued.*

3in. to 5in. long, pale beneath. *h.* 3ft. to 6ft. Mountains of Southern United States, 1809. Hardy. (B. M. 1671.)

R. caucasicum (Caucasian).* *fl.* corymbose; corolla rose-coloured outside, white within, spotted with green at the throat, campanulate-infundibuliform. August. *l.* lanceolate, ovate, or nearly obovate, slenderly veined above, beneath clothed with much-adpressed, ferruginous tomentum, the margins revolute. Stems diffuse or decumbent. *h.* 1ft. Caucasus, 1803. Hardy. (B. M. 1145.) The following are handsome varieties of this species:

R. c. albiflorum (white-flowered). A hybrid with white flowers, not so desirable as the type. (B. M. 3811, under name of *R. c. hybridum.*)

R. c. flavidum (yellowish-flowered). *fl.* straw-colour, spotted with green.

R. c. Nobleanum (Noble's). *fl.* of an intense rose-colour both outside and within. *l.* oblong.

R. c. pulcherrimum (very pretty). *fl.* rose-colour. *l.* oblong. A pretty hybrid between *R. arboreum* and *R. caucasicum.* (B. R. 1820, under name of *R. pulcherrimum.*)

R. c. stramineum (straw-coloured). *fl.* straw-colour, fulvous-spotted within. *l.* oblong. (B. M. 3422.)

R. Chamæcistus (Chamæcistus). A synonym of *Rhodothamnus Chamæcistus.*

R. Championi (Champion's). *fl.* white, tinged with delicate rose-colour, or white with the upper lip pale yellow towards the centre, and copiously dotted with ochre; calyx hispid, deeply cleft into four rather long segments; corolla 4in. across, the tube rather short, campanulate; stamens ten; umbels four to six-flowered; peduncles hispid. April. *l.* shortly petioled, lanceolate, shortly acuminate, reticulated, flat, dark green above, rusty beneath, where the margins, costa, and veins, are clothed with short, bristly hairs. *h.* 7ft. Hong Kong, 1881. (B. M. 4609.)

R. ciliatum (ciliated).* *fl.* pale reddish-purple, inclined, in three to many-flowered, terminal heads; sepals veined, ciliated; corolla 1½in. long, and nearly as much across; tube rather contracted below; limb of five lobes, the upper one obscurely spotted. May. *l.* elliptic, acuminate, coriaceous, 2in., rarely 3in., long, sometimes obscurely cordate at the base; upper surface (except in age) pilose, even villous when young; beneath quite glabrous, covered with minute, ferruginous scales. *h.* 2ft. Sikkim. A small, more or less pilose or setose, hardy, rigid species. (R. S. H. xxiv.)

R. c. roseo-album (rose-and-white). *fl.* white, tinged with rose, larger than in the type. (B. M. 4648.)

R. cinnabarinum (cinnabar-red).* *fl.* rather small, nodding, usually four to eight in a loose head; calyx segments of various sizes; corolla brownish-red, with a long tube; the lobes rounded, spreading, and slightly acuminated; stamens ten, included. April and May. *l.* ovate or oblong-lanceolate, acute at both ends, 2in. to 3in. long, 1in. wide, dull green above, ferruginous beneath. Branches slender. Sikkim, 1851. Half-hardy. (R. S. H. viii.) *R. Roylei* (R. S. H. vii.) is nearly allied to this.

R. citrinum (citron-coloured). *fl.* drooping, fragrant, rather small, umbellate; calyx shortly five-lobed; corolla pale lemon-colour, more than ¾in. long, campanulate; limb of five nearly erect, retuse lobes; stamens five, included; anthers deep orange. May. *l.* on short petioles, spreading, the largest not more than 2in. long, elliptic-oblong, obtuse, glabrous, coriaceous, dark green above; beneath, paler, and dotted with minute, pale-greenish scales. Java, 1854. A small, stove species. (B. M. 4797.)

R. Clivianum (Duchess of Northumberland's).* *fl.* white, slightly tinged with pale pink, especially on the margins; within, profusely dotted with light purplish-red. A hybrid, believed to have been produced between *R. arboreum* and *R. catawbiense.* It is a perfectly hardy, strong-growing plant, but is well worthy of protection while in flower. (B. M. 4478.)

R. dahuricum (Dahurian).* *fl.* rose-coloured, solitary or in twos or threes at the tips of the branches, on short pedicels; calyx very shortly or scarcely five-toothed; corolla rotate-campanulate, not lepidoted. March. *l.* oval-oblong, mucronulate, glabrous, lepidoted, paler beneath, deciduous. *h.* 3ft. Dahuria, 1780. An erect, hardy species. See Fig. 367. (A. B. R. 4; B. M. 636; L. B. C. 1605.)

R. d. sempervirens (evergreen). *fl.* of an intense purple. *l.* persistent, dark green. (B. M. 1888; B. R. 194, under name of *R. d. atrovirens.*)

R. Dalhousiæ (Lady Dalhousie's).* Epiphytal Rhododendron. *fl.* lemon-scented, three to seven in an umbellate head, the spread of which is greater than that of the leaves; calyx large, deeply divided into five foliaceous lobes; corolla white, with an occasional tinge of rose, 3½in. to 4½in. long, and as broad at the mouth, campanulate, much like that of *Lilium candidum*; lobes very broad, waved, spreading; stamens ten; peduncles stout, nearly ½in. long. April to July. *l.* few, patent or reflexed, petiolate, 4½in. to 5in. long, elliptic-obovate, obtuse at base, attenuated below into a more or less downy footstalk about ½in. long, darkish-green, inclining to yellow above, beneath paler. Stems clothed with reddish, papery bark. Branches spreading, whorled. *h.* 6ft. to 8ft. Sikkim, 1850. A straggling, half-hardy epiphyte, especially found on Oaks and Magnolias. (B. M. 4718; F. d. S. 460; R. S. H. i. ii.)

R. D. hybridum (hybrid). A hybrid between *R. Dalhousiæ* and *R. formosum.* The flowers are as large as those of the former, but have derived a tinge of pink from *R. formosum*; the ciliated calyx also resembles that of the latter species, while the leaves are intermediate in size, and quite glabrous. (B. M. 5322.)

R. Edgeworthii (Edgeworth's).* *fl.* showy, inclined; calyx large, of five deep, spreading, coloured lobes, very downy on the back, the edges finely ciliated; corolla white, often tinged with blush or pale yellow; tube rather short, widening much at the mouth; limb more than 4in. across, spreading, of five nearly equal lobes; stamens ten; peduncles terminal or axillary, usually two or three together. May and June. *l.* 2in. to 4in. long, ovate-lanceolate, acute or suddenly acuminate, obtuse at base, the margins recurved, the upper surface singularly wrinkled from impressed, reticulated veins; petioles about ¾in. long. Sikkim, 1851. Shrub with straggling branches, often pendulous upon trees and rocks. The flowers are so fragrant that a few are sufficient to scent a large room. (B. M. 4936; F. d. S. 797-8; R. S. H. xxi.)

R. eximium (choice). A synonym of *R. Falconeri.*

FIG. 367. FLOWERING BRANCH OF RHODODENDRON DAHURICUM.

R. Falconeri (Dr. Falconer's).* *fl.* white, numerous, rather small, densely placed in small, globose heads; calyx very minute; corolla of ten rounded lobes; peduncles erect, elongated after flowering. May. *l.* very coriaceous, 8in. to 12in. long, 5in. to 7in. wide; upper side glossy-green, fading to yellow on the margins, which are quite plane; beneath, except on the midrib and reticulated veins, clothed with short, dense, pale ferruginous down; young leaves velvety-downy. Trunks two or three from the same point, often 2ft. in diameter. *h.* 30ft. Sikkim, 1850. Half-hardy tree. (B. M. 4924; F. d. S. 477-80; R. S. H. x.) SYN. *R. eximium.*

R. Farreræ (Mrs. Farrer's). *fl.* of a pale lilac-rose colour, terminal; calyx very shortly five-lobed; corolla campanulate, the lobes spreading and undulated. March. *l.* coriaceous, ovate, obtuse, mucronulate, slightly attenuated at base, reticulate-veined, hairy on both sides, the margins slightly recurved and ciliated; petioles, as well as the branchlets, villous-pilose. *h.* 3ft. China, 1829. Hardy. (S. B. F. G. ser. ii. 95.)

R. ferrugineum (rusty-leaved).* Alpine Rose. *fl.* of a beautiful scarlet colour, marked with ash-coloured or yellow dots, disposed in umbels; calyx lobes five, short, obtuse; corolla funnel-shaped. May to July. *l.* oblong, attenuated at both ends, glabrous and shining above, thickly beset with ferruginous dots beneath, and much resembling those of the Box-tree; when young, ciliated, with a few hairs beneath. *h.* 1ft. Europe, 1752. Hardy. (J. F. A. 255; L. B. C. 65.)

R. f. albiflorum (white-flowered). A variety having white flowers. (S. B. F. G. ser. ii. 258, under name of *R. f. album.*)

R. formosum (beautiful).* *fl.* few, terminal; calyx small, scarcely lobed; corolla white, slightly tinged with purple and yellow,

Rhododendron—*continued.*

large, sub-campanulate, with an angular tube. April. *l.* lanceolate, obtuse, shining above, beneath (as well as the outside of the corolla) lepidote. Branches smooth. *h.* 3ft. to 8ft. Eastern Himalaya, 1815. (B. M. 4457.)

R. Fortunei (Fortune's).* *fl.* pendulous, fragrant, loosely clustered in heads of eight to ten, on peduncles ½in. to 1in. long; calyx discoid, small; corolla of a fine pale rose-colour, shortly campanulate, 3in. to 5½in. in diameter, with seven rounded lobes; stamens fourteen. May. *l.* 5in. to 7in. long, oblong or linear-oblong, acute, bright green, but opaque above, glaucous below, acute, rounded or cordate at base; petioles red-brown, ½in. to 1in. long. Branches very stout, terete. *h.* 12ft. China, 1859. Hardy. (B. M. 5596.)

R. fulgens (brilliant). *fl.* on short pedicels, in dense heads; calyx obsolete or very short; corolla of a deep bright blood-red, somewhat fleshy, highly polished and shining, campanulate, with a slightly compressed tube, and a limb of five recurved lobes. June. *l.* broadly obovate or ovate-elliptic, rounded at apex, cordate at base, 4in. long, 3in. broad, tolerably constant, coriaceous, glossy above, densely woolly beneath, the margins recurved. *h.* 4ft. Eastern Himalaya, 1851. (B. M. 5317; F. d. S. 789; R. S. H. xxv.)

R. glaucum (glaucous).* *fl.* erect or inclined; calyx deeply five-parted, with leafy lobes; corolla pale pinkish-purple, above 1in. long, and about as broad, with a campanulate tube and a moderately spreading limb of five emarginate lobes: stamens ten, included. May. *l.* rather crowded at the tips of the branches, 1in. to 3in. long, usually 1in. to 1½in. broad, shortly petioled, oblong or broadly lanceolate, obtuse, with a mucro, when old naked above; below glaucous, almost white, and dotted with copious little scales, which abound on young leaves, bracts, buds, peduncles, and calyx segments. *h.* 2ft. Sikkim, 1850. Half-hardy. (B. M. 4721; F. d. S. 672; R. S. H. xvii.)

R. grande (large).* *fl.* white, 2in. to 3in. long, 2in. to 2½in. in diameter; calyx very short, obscurely lobed; corolla limb of rather short segments; stamens ten; stigma swollen. March. *l.* obovate-oblong, acute, attenuated into the thick petioles, 6in. to 12in. long, 3in. to 5in. broad, nearly flat, glabrous, full green above, silvery-white beneath; when in bud, very beautiful, erect and silky, at first enveloped in large scales. Trunks solitary or two or three together, spreading, branched above. *h.* 30ft. Sikkim, 1850. Tree. SYN. *R. argenteum* (B. M. 5054; F. d. S. 473-6; R. S. H. ix.).

R. Griffithianum Aucklandii (Griffith's, Lord Auckland's var.). A synonym of *R. Aucklandii.*

R. hirsutum (hairy).* Alpine Rose. *fl.* pale red or scarlet, disposed in umbellate corymbs; calyx lobes oblong, obtuse; corolla funnel-shaped, the outside, as well as the calyx, having resinous dots; pedicels bristly. May to July. *l.* sub-elliptic, rigid-ciliated, ferruginous-dotted beneath, glabrous on both sides. *h.* 1ft. to 2ft. South Europe, 1656. Hardy. (B. M. 1853; J. F. A. 98; L. B. C. 479.)

R. Hodgsoni (Hodgson's). *fl.* delicate pale purple or rose-colour, in heads 4in. to 6in. in diameter; calyx obsolete; corolla tube 1½in. long, broadly campanulate; limb spreading, 2in. to 2½in. across, eight-lobed; stamens sixteen to eighteen; anthers dark purple-brown. May and June. *l.* terminal on the ultimate branches, spreading, 1ft. to 1½ft. long, oblong-elliptic, obovate or ovate-lanceolate, obtuse, nearly cordate at base, thickly coriaceous, glabrous and glossy-green above, the margins recurved; beneath, except the midrib, clothed with pale silvery-white, rarely ferruginous tomentum; petioles very stout, 1in. to 2in. or more long. Bark pale flesh-colour. *h.* 12ft. to 20ft. Eastern Himalaya, 1851. A small tree, branching from the base. (B. M. 5552; R. S. H. xv.)

R. Hookeri (Hooker's).* *fl.* red, in many-flowered corymbs; calyx ample, campanulate, obsoletely lobed; corolla campanulate, with five deeply bilobed lobes; stamens ten. April. *l.* coriaceous, highly glabrous, rigid, oblong-oval, obtuse, long-stalked, rounded at base, glaucescent beneath, 3in. to 5½in. long, 1in. to 1½in. broad; nerves furfuraceous-pubescent; petioles thick, 1in. long. *h.* 12ft. to 14ft. Bhotan. An erect species. (B. M. 4926.)

R. jasminiflorum (Jasmine-flowered).* *fl.* many, in terminal umbels; calyx obscurely five-lobed; corolla white, slightly tinged with rose below the limb; tube 2in. long, straight, scarcely gibbous at the base; limb spreading, of five obovate, wavy lobes; stamens ten; anthers red. May. *l.* crowded towards the tips of the branches; lowermost ones sub-verticillate on short petioles, obovate-oblong, rather acute, glabrous, nearly coriaceous. *h.* 2ft. Malacca, 1849. (B. M. 4524; L. & P. F. G. i. 70.)

R. javanicum (Javan).* *fl.* fascicled, eight to twelve or more, large and handsome; calyx very small, five-lobed; corolla orange-coloured, with scattered red spots, between funnel and bell-shaped; tube gradually widening upwards into a limb of five nearly equal lobes; stamens ten, slightly ascendent; anthers dark purple. All seasons. *l.* scattered, oblong-oval, or approaching obovate, acute, tapering into a short petiole, naked above, beneath minutely dotted with very small, brown, peltate scales. Branches spreading. *h.* 4ft. Java, 1847. (B. M. 4336; P. M. B. xv. 217.)

R. Jenkinsii (Jenkins'). *fl.* white, four to six in a corymb; calyx segments short; corolla lobes sub-equal, rounded, obtuse; style very long. *l.* shortly petioled, oblong-lanceolate, acute, cuneate at base, 4in. to 5½in. long, 1in. to 1½in. broad, glaucous and densely scaly beneath. *h.* 6ft. to 7ft. Bhotan. (R. G. ix. 277.)

R. kamtschaticum (Kamtschatka). *fl.*, calyx lobes oblong, leaf-like; corolla purplish-red, striped inside with dark purple, nearly 1½in. in diameter, the lobes obtuse and not callous at the apex. July. *l.* oval, slightly acute, reticulated, five-nerved, naked, ciliated. Kamtschatka, North America, &c., 1802. A procumbent, hardy sub-shrub. (L. & P. F. G. i. 22, under name of *Rhodothamnus kamptschaticus.*)

R. Kendrickii latifolium (Kendrick's broad-leaved). *fl.* ten to fifteen in a rather loose, globose head; calyx of five small teeth; corolla bright scarlet, broadly campanulate, equally five-lobed; stamens ten. Spring. *l.* 4in. to 6in. long, about 1in. wide, generally undulated on the margins, more or less whorled, green on both surfaces; young ones (and other parts of the plant) clothed with reddish, glutinous hairs that disappear in age. Trunk 7in. to 8in. in girth. Bhotan, 1859. Hardy. (B. M. 5129.)

R. Keysii (Keys'). *fl.* red, yellow, small, five or six in a corymb; calyx five-toothed; corolla tubular or urceolate, the lobes ovate, obtuse; stamens ten; filaments exserted. July. *l.* 2½in. to 3in. long, about 1in. broad, ovate-lanceolate, acute, glabrous, glaucous and scaly beneath. *h.* 2ft. to 6ft. Bhotan, 1851. (B. M. 4875; F. d. S. 1110.)

R. lanatum (woolly).* *fl.* rather large, inclined, in terminal corymbs of six to ten; calyx minute, five-toothed; corolla yellowish-white or pale sulphur-colour; tube broad-campanulate, within, above, and three of the upper lobes in part, red-dotted; limb 2in. to 2½in. across, of five very spreading, entire lobes. June. *l.* at the tips of the branches, 3½in. to 5in. long, about 2in. broad, obovate or elliptical, obtuse, shortly mucronate, rather acute, or at most obtuse, at the base; under surface, as well as ultimate branchlets, peduncles, and petioles, covered with adpressed, white or tawny, cottony tomentum. Trunk 6in. in diameter. Sikkim, 1851. A large shrub or small tree. (F. d. S. 684; R. S. H. xvi.)

R. lapponicum (Lapland). *fl.* violet-purple, few in an umbel; corolla open bell-shaped, dotted, with a short tube and a rotate limb; stamens five to ten. July. *l.* elliptic, obtuse, ¼in. long, rigid, persistent, and, as well as the branches, dotted with rusty scales. *h.* 6in. Arctic regions, 1825. Hardy, tufted shrub. (B. M. 3106.)

R. lepidotum (scaly).* *fl.* on slender pedicels, 1½in. to 2in. long; calyx lobes obtuse, somewhat leaf-like; corolla yellow or purple, 1in. across, lepidoted, especially on the outside of the tube; upper lobes spotted with green; anthers large, rich red-brown. May and June. *l.* obovate, lanceolate, or oblong, shortly apiculate, petiolate, pale green. *h.* 2ft. to 4ft. Sikkim, 1829. Half-hardy. (B. M. 4657; R. S. H. xxiii.; under names of *R. elæagnoides* and *R. salignum.*)

R. l. chloranthum (yellow-flowered). *fl.* of a yellowish-green colour, with green spots. (B. M. 4802.)

R. l. obovatum (obovate-leaved). *fl.* few, terminal; corolla maroon-purple, 1in. in diameter, salver-shaped; stamens usually eight, rarely ten. May. *l.* pale glaucous-green, ¼in. to 1½in. long, emitting a resinous odour, obovate. A stout or slender, twiggy shrub, forming extended clumps 1ft. to 4ft. high, branching from a woody, tortuous rootstock. (B. M. 6450.)

R. Maddeni (Madden's).* *fl.*, calyx always small, five-lobed; corolla pure white, with a faint blush, chiefly on the upper lobe, 3½in. to 4in. long, and as much across; tube sparingly lepidoted, funnel-shaped; limb very large, spreading, of five rounded, entire lobes; stamens eighteen to twenty, as long as the tube; peduncles about three, short and stout. June to August. *l.* abundant, elliptic-lanceolate, acute or acuminate, 4in. to 7in. long, gradually tapering to rather short, ferruginous petioles, frequently pendulous; young ones entirely, perfect ones usually beneath only, clothed with dense, white squamules, which become ferruginous with age. *h.* 6ft. to 8ft. Sikkim, 1850. Half-hardy. (B. M. 4805; F. d. S. 912; R. S. H. xviii.)

R. malayanum (Malayan). *fl.* nodding, ¾in. long, in terminal, few-flowered umbels, on short, curved peduncles; calyx minute, five-toothed; corolla dull scarlet; tube ¾in. long, gibbous at base; limb flat, horizontal, ¼in. to ½in. across; stamens ten. Summer. *l.* 3in. to 4in. long, elliptic or elliptic-lanceolate, acute at both ends, coriaceous, narrowed into a petiole ¼in. to ¾in. long, dark green above, red-brown beneath. Branches red-brown. Branchlets, leaves beneath, petioles, pedicels, calyx, ovary, and corolla (sparingly), clothed with red-brown, lepidote scales. Malayan Archipelago, 1854. A large, stove shrub or small tree. (B. M. 6045.)

R. maximum (greatest). American Great Laurel. *fl.* on viscid pedicels; corolla pale rose-colour or nearly white, greenish in the throat on the upper side, and spotted with yellow or reddish, 1in. broad, campanulate. July. *l.* elliptic-oblong or lanceolate-oblong, 4in. to 10in. long, very thick, acute, narrowed towards the base, very smooth, with somewhat revolute margins. *h.* 6ft. to 20ft. North America, 1756. Hardy shrub or tree. (B. M. 951.)

R. m. hybridum (hybrid). *fl.* fragrant, often as large as those of *R. ponticum*; corolla pale purplish, with acute lobes.

Rhododendron—*continued.*

l. attenuated at base, scarcely glabrescent beneath. Garden hybrid. (B. M. 3454.) *R. m. bigener* (B. R. 195) is almost identical with this.

R. Metternichii (Metternich's).* *fl.* rose-coloured, sub-campanulate, disposed in corymbose heads. Spring. *l.* oblong or obovate-oblong, coriaceous, ferruginous-tomentose beneath. Japan, 1870. Hardy shrub. (S. Z. F. J. 9.)

R. nilagericum (Neilgherries). *fl.* pink, in a large, terminal, capitate raceme; calyx small, very shortly five-lobed; corolla campanulate, the segments undulated, rounded, and bilobed. May. *l.* elliptic or oblong, sub-obtuse, acute, reticulately veined, the margins revolute, above opaque, beneath densely clothed with loose, ferruginous tomentum. *h.* 25ft. Neilgherries, 1840. Tree. A variety of *R. arboreum.* (B. M. 4381; F. d. S. 1030-1.)

R. niveum (snowy-leaved). *fl.* rather numerous, moderately large, on short, tomentose peduncles; calyx very small; corolla externally yellowish-lilac, internally pale lilac, blotched with deeper lilac, and at the inner base having five deep blood-purple spots, broadly campanulate, narrow at base; limb five-lobed, retuse and slightly waved; stamens ten, included. May. *l.* moderately large, spreading, opaque on both sides, obovate-lanceolate, tapering below into a short footstalk; young leaves white-tomentose all over, afterwards glabrous above, clothed beneath with white, appressed, flocculent tomentum. Sikkim, 1850. Shrub. (B. M. 4730.)

R. n. fulvum (tawny). *fl.* of a deeper purple colour, and with larger trusses, than in the type. *l.*, under-surface buff-coloured. Sikkim, 1885. A handsome plant. (B. M. 6827.)

R. Nuttallii (Nuttall's).* *fl.* white, scarcely rosy, fragrant, in corymbs of four to six; calyx lobes large, rather thick, oblong-oval, obtuse; corolla sub-campanulate, 4½in. to 5in. long, five-lobed; stamens ten. May. *l.* large, coriaceous, oval, obtuse at both ends, apiculate, below closely reticulated with dark scales. *h.* 12ft. to 30ft. Bhotan, 1859. Shrub or tree. In a wild state, this frequently occurs as an epiphyte on the branches of large trees. (B. M. 5146.)

R. parvifolium (small-leaved). *fl.* pale rose, in small, compact, terminal umbels; calyx small, five-toothed; tube half as long as the five-lobed, sub-campanulate limb. Spring. *l.* ½in. to ¾in. long, oblong, acute, attenuated at base, scaly on both sides, green above, rusty beneath. Baiacul, 1877. An erect, flexuously-branched, hardy species. (R. G. 902.)

R. pendulum (pendulous). *fl.* small; calyx large in proportion, deeply cut into five lobes; corolla pure white, about 1in. in diameter, externally lepidote; tube very short, gradually expanding into a five-lobed limb; stamens ten. Spring. *l.* chiefly at the tips of the ultimate branches, on short petioles, spreading, between elliptic and oblong, acute, mucronate, 1½in. to 2in. long, about ¾in. broad, the margins recurved, beneath densely ferruginous-tomentose. Stems 3ft. to 4ft. long. Sikkim. An epiphyte on trees. (F. d. S. 662; G. C. n. s., xvii. 429; R. S. H. xiii.)

FIG. 368. FLOWERING BRANCHLET OF RHODODENDRON PONTICUM.

R. ponticum (Pontic). *fl.* purple, often spotted on the upper lobe, about 2in. in diameter, disposed in short, terminal corymbs; calyx lobes sub-acute, very short; corolla campanulate-rotate, the lobes sometimes lanceolate and acute, sometimes obtuse. May. *l.* oblong-lanceolate, attenuated at both ends, glabrous, pale or slightly ferruginous beneath. *h.* 6ft. to 12ft. Asia Minor, 1763. Hardy. See Fig. 368. (B. M. 650.) Of this species, there are several varieties; the following call for mention:

R. p. azaleoides (Azalea-like). *fl.*, corolla lobes much undulated, unspotted. *l.* lanceolate, sub-deciduous. Hybrid. (A. B. R. 379, under name of *R. p. deciduum.*)

R. p. myrtifolium (Myrtle-leaved). *fl.* purplish, unspotted; corolla scarcely 1in. in diameter. *l.* smaller than in the type, being about 2in. long. (L. B. C. 908, under name of *R. myrtifolium.*)

R. punctatum (dotted). *fl.* in dense corymbs; calyx lobes small, rounded, sometimes minute; corolla rose-colour, spotted within, somewhat funnel-shaped, longer than the pedicels. May and June. *l.* elliptic, 2in. to 3in. long, acute at each end (sometimes 1in. to 1½in. long, oval or obovate and obtuse), glabrous; under surface, as well as the corymbs, thickly dotted with resinous globules. *h.* 4ft. to 6ft. North America, 1786. (A. B. R. 36; W. D. B. 162A, under name of *R. p. minus.*)

R. p. majus (larger). *fl.*, corolla unspotted, larger than in the type. *l.* also larger. (B. R. 37.)

R. retusum (blunt-leaved). *fl.* somewhat drooping, six to nine in an umbel, on red, hairy peduncles about ¾in. long; calyx minute, yellow-green, five-toothed; corolla bright scarlet without, yellowish inside the tube, 1¼in. to 1½in. long, tubular-infundibuliform, the base ventricose, the limb moderately spreading; stamens ten, a little exserted. May. *l.* 2in. to 2½in. long, almost sessile, oblong or elliptic-obovate, evergreen, coriaceous, spreading, glabrous, the margins recurved, the apex very obtuse, or often retuse; old ones slightly ferruginous beneath. Branches woody, brown in age. *h.* 1ft. to 2ft. Java, 1853. Stove. (B. M. 4859; F. d. S. 1044; I. H. 70.)

R. Rollisoni (Rollison's). *fl.* in a round and compact head like that of *R. arboreum*, but the colour is much richer, being a deep blood-red, with a few dark spots at the bottom of the tube; calyx obsolete; corolla campanulate; peduncles tomentose. Spring. *l.* short, oblong, acute, obtuse or even cordate at base, wavy, very rugose and convex, revolute on the edges, covered beneath with close, pale brown wool. Ceylon. A small, hardy tree, with rugged, corky bark. In its native place, it attains a height of 30ft. and a girth of 4ft. (L. & P. F. G. i. 7.)

R. Shepherdii (Shepherd's). *fl.* of a deep scarlet, disposed in large, terminal heads like those of *R. barbatum*; calyx small, but distinct, four-lobed; corolla broadly campanulate, equally five-lobed; stamens ten. Spring. *l.* towards the ends of the branchlets, oblong or elliptic-oblong, acute, 3in. to 4in. long, about 1in. wide, deep green above, pale below, very thick and opaque; young ones deep purplish-red beneath. *h.* 6ft. Bhotan, 1859. (B. M. 5125.)

R. Smithii (Smith's). A synonym of *R. barbatum Smithii.*

R. Thomsoni (Thomson's).* *fl.* in a corymb of six to eight, on peduncles 1in. or more long; calyx red in the upper half, green below, ¾in. long and wide; corolla deep blood-red and glossy; tube elongated, 2in. long, often vertically compressed; limb large, much spreading, five-lobed, the upper one spotted; stamens ten, slightly exceeding the tube. June. *l.* 2in. to 3in. long, very broad, generally orbicular-ovate, but sometimes nearly orbicular, blunt and shortly mucronate at apex, quite glabrous, sub-glaucous below. *h.* 6ft. to 10ft., or sometimes 15ft. Sikkim, 1851. (B. M. 4997; F. d. S. 688-90; R. S. H. xii.)

R. triflorum (three-flowered). *fl.*, calyx very short, five-toothed or lobed; corolla greenish-yellow, resembling that of the common Azalea; limb nearly 2in. across, of five spreading segments; stamens eight, much exserted, the style much longer; peduncles usually in threes, ½in. to ¾in. long. May and June. *l.* often pendulous, on rather short, slender petioles, ovate-lanceolate, approaching oblong or elliptical, 2in. (rarely 3in.) long, acute at both ends, or cordate at base and sometimes blunt, beset with ferruginous squamules below. Branches twiggy. *h.* 4ft. to 6ft. Sikkim, 1850. Half-hardy. (G. C. n. s., xviii. 45; R. S. H. xix.)

R. Veitchianum (Veitch's).* *fl.* pure white, three or four together from the apex of a branch; corolla very large, between campanulate and funnel-shaped, the margins of the limb singularly waved and crisped. May. *l.* 3in. to 4in. long, obovate, acute, mucronate, very shortly petiolate, glaucous and clothed with red or ferruginous scales beneath. *h.* 6ft. Moulmein, 1850. Half-hardy. (B. M. 4992.)

R. virgatum (twiggy). *fl.* very delicate rose-colour, axillary from the upper and more crowded leaves, nearly sessile, when fully expanded forming a leafy head. April. *l.* scattered, petiolate, short or oblong-lanceolate, acute and slightly mucronate. Branches twiggy, slender, the new shoots covered with copious, peltate scales. *h.* 1½ft. Sikkim-Himalaya, 1850. Half-hardy. (B. M. 5060.)

R. Wallichii (Wallich's). A form of *R. campanulatum.*

R. Wightii (Wight's). *fl.* on slender pedicels, 1in. to 1½in. long, faintly honey-scented, twelve to twenty in heads larger than those of *R. arboreum*; calyx obsolete; corolla pale straw-colour, stained and spotted with blood-colour on the inside of the tube and upper lobes, large and very beautiful, truly bell-shaped, five-lobed at the insertion of the pedicel; stamens ten. June. *l.* 6in. to 8in. (rarely 10in.) long, 2½in. to 3in. broad, very coriaceous,

Rhododendron—*continued.*

rather flat, deep green above, covered with rusty-cinnamon tomentum beneath, rarely pale and nearly white in the young foliage; petioles ½in. long, stout. *h.* 6ft. to 14ft. Sikkim, 1851. A small, shrubby tree. (R. S. H. xxvii.)

R. Wilsoni (Wilson's). A hybrid between *R. ciliatum* and *R. glaucum*. It has the foliage of the former without the hairs, and is destitute of the glaucous hue of the latter. The corolla is longer than in *R. glaucum*, but with a prevalence of the same rose-colour, not verging to white, as in *R. ciliatum*. (B. M. 5116.)

R. Windsori (Windsor's). *fl.* many in a crowded head; calyx lobes elongated, tapering; corolla deep crimson-scarlet, the lobes all emarginate; stamens ten. Spring. *l.* coriaceous, obovate-lanceolate, acute, 4in. to 5in. long, 1in. to 1½in. broad, strongly reticulated and pinnately nerved, shining, white and silvery beneath, at length pale brown. Bhotan. A small, half-hardy tree. (B. M. 5008.)

Varieties. There are almost endless varieties of *R. ponticum* in cultivation, and the hybrids which require greenhouse treatment are now becoming somewhat numerous, as many of the species and their progeny have been, from time to time, used for seed-raising. The following list includes a selection of good kinds, but very many others have, of necessity, to be omitted:

Hybrid Greenhouse Rhododendrons. COUNTESS OF HADDINGTON, pink, changing to blush-white. COUNTESS OF SEFTON, white, tinged rose. DUCHESS OF CONNAUGHT, vermilion-red; of good substance. DUCHESS OF EDINBURGH, rich, glowing crimson. DUCHESS OF SUTHERLAND, white. DUCHESS OF TECK, buff. FAVOURITE, delicate satiny-rose; large, compact trusses; new, 1866. LADY SKELMERSDALE, pure white. LORD WOLSELEY, pale buff-yellow; flowers large, new, 1866. MAIDEN'S BLUSH, blush-white. PRINCESS ALEXANDRA, pure white; flowers waxy; very beautiful. PRINCESS ALICE, white, tinged pink. PRINCESS FREDERICA, pale buff. PRINCESS ROYAL, pink or rose-coloured; one of the oldest and best-known hybrids. TAYLORI (see Fig. 369, for which we are indebted to Messrs. James Veitch and Sons), pink, tube of corolla white.

Hardy Rhododendrons. Hybrids of *R. ponticum*. ACHIEVEMENT, clear rosy-scarlet, white centre. ALBUM GRANDIFLORUM, blush; fine truss and foliage. ALEXANDER DANCER, bright rose, lighter centre; one of the finest. ATROSANGUINEUM, intense blood-red; one of the hardiest. AUGUSTUS, purplish-crimson or plum-colour. BARCLAYANUM, deep rosy-crimson; late. BLANDYANUM, rosy-crimson; extra fine. CANDIDISSIMUM, blush, changing to white. CARACTACUS, rich purplish-crimson; fine truss; one of the best. CHANCELLOR, purplish-lilac, spotted. CHARLES DICKENS, dark scarlet; fine habit and foliage. DELICATUM, blush, changing to white, with a distinct brown spot; fine habit. DUCHESS OF BEDFORD, deep rose, light centre. EVERESTIANUM, rosy-lilac, spotted and fringed; free-flowering. FAIR HELEN, pure white, marked with rich yellow spot. FREDERICK WATERER, crimson; very showy. GEORGE PAUL, crimson, finely spotted; free-flowering. HELEN WATERER, centre white, edged with crimson. H. W. SARGENT, crimson; very large trusses. IAGO, pale rose, spotted. JAMES MACINTOSH, rosy-scarlet; splendid habit and foliage. JAMES NASMYTH, rosy-lilac, blotched maroon; large truss. J. MARSHALL BROOKS, rich scarlet, bronze spot; distinct. LADY ARMSTRONG, pale rose, much spotted; beautiful. LADY ELEANOR CATHCART, pale rose, spotted chocolate. LUCIDUM, purplish lilac, brown spots; free-flowering. MARCHIONESS OF LANSDOWNE, pale rose, intense black spot; distinct and

FIG. 369. FLOWERING BRANCHLET OF RHODODENDRON TAYLORI.

Rhododendron—*continued.*

telling. MICHAEL WATERER, crimson-spotted; fine. MINNIE, blush-white, spotted with chocolate; distinct. MONT BLANC, white, dwarf, and free-flowering. MRS. JOHN CLUTTON, white; one of the best in cultivation. MRS. WILLIAM BOVILL, rich rosy-scarlet; one of the most attractive. MURILLO, rich crimson. NERO, dark rosy-purple, richly spotted. PRINCESS MARY OF CAMBRIDGE, light blush, deeper edging. PURITY, white, faint yellow eye; very showy. REEDIANUM, bright cherry; very pretty. ROSABEL, pale rose; fine foliage and habit. SIR ISAAC NEWTON, plum-colour, shaded and spotted. SIR THOMAS SEBRIGHT, rich purple, distinct bronze blotch. SNOWFLAKE, pure white; conical truss; distinct and beautiful. STANDARD OF FLANDERS, blush, distinctly spotted; very showy. STELLA, pale rose, intense chocolate blotch; free-flowering. SYLPH, bright rosy-pink; fine truss. THE QUEEN, blush, changing to white; fine shape. TITIAN, clear rosy-scarlet; one of the best. VANDYCK, rosy-crimson; good. VERSCHAFFELTII, blush, much spotted. VESTAL, pale rose, much spotted; fine truss. WILLIAM DOWNING, rich dark puce, finely blotched.

RHODOLEIA (from *rhodon*, a rose, and *leios*, smooth; perhaps referring to the rose-like flowers and the spineless stems). ORD. *Hamamelideæ*. A genus comprising a couple of species of small, highly glabrous, greenhouse or stove trees, with the habit of *Rhododendron*; one is from Hong Kong, and the other a native of Sumatra. Flowers hermaphrodite, about five in an axillary, pedunculate, nodding head, girded by a coloured, many-leaved involucre; petals rose-colour, two to four, very unequal, clawed; stamens seven to ten, inserted with the petals. Leaves crowded at the tips of the branchlets, spreading, alternate, long-petioled, evergreen, glaucous beneath, oblong, entire, thickly coriaceous. For culture of *R. Championi*—the only species introduced—*see* **Gardenia.**

R. Championi (Champion's). *fl.* 2½in. in diameter; outer involucral leaflets (sepals) about twelve; inner ones (petals) about eighteen. February. *fr.* of five radiating capsules, each the size of a small hazel-nut. *l.* bright green, elliptic-obovate, obtuse. Hong Kong, 1852. (B. M. 4509.)

RHODOMYRTUS (from *rhodon*, a rose, and *Myrtos*, Myrtle; in allusion to the rose-coloured flowers of some species, and the alliance to the Myrtle). ORD. *Myrtaceæ*. A genus containing five species of stove or greenhouse, villous or tomentose trees or shrubs; one is dispersed over tropical Asia, from the Indian Archipelago as far as China, and the rest are natives of Eastern Australia. Flowers often rather large, axillary; calyx tube scarcely or not produced above the ovary; limb of four or five herbaceous, persistent segments; petals four or five, spreading; stamens densely many-seriate, free; peduncles one to three-flowered, rarely racemosely five to seven-flowered, rather long or very short. Leaves opposite, penniveined or triplinerved. *R. tomentosa* is the only species known to gardeners. For culture, *see* **Myrtus.**

R. tomentosa (tomentose).* Hill Gooseberry; Indian Hill Guava. *fl.* rose-colour; calyx five-fid; peduncles one to three-flowered, shorter than the leaves, with two ovate bracteoles beneath the flowers. June. *l.* ovate, the younger ones velvety above, cano-tomentose beneath, three-nerved; lateral nerves submarginal. *h.* 5ft. China, &c., 1776. Greenhouse shrub. (B. M. 250, under name of *Myrtus tomentosa*.)

RHODORA (from *rhodos*, a rose; alluding to the colour of the showy flowers). ORD. *Ericaceæ*. A monotypic genus. The species is a hardy, deciduous shrub, included by Bentham and Hooker, under **Rhododendron** (which *see* for culture).

R. canadensis (Canadian).* *fl.* rose-purple (rarely white), in shortly-stalked, umbel-like clusters, appearing rather earlier than the leaves, showy. *l.* oblong, deciduous, whitish and downy beneath. *h.* 2ft. to 4ft. North America. (B. M. 474; T. S. M. 441.) The correct botanical name of this plant is *Rhododendron Rhodora*.

RHODORHIZA. Included under *Convolvulus*.

RHODOSPATHA (from *rhodon*, a rose, and *spatha*, a spathe; alluding to the colour of the spathe in some species). ORD. *Aroideæ* (*Araceæ*). A genus comprising six or seven species of stove, climbing, tropical American shrubs, with rooting branches. Flowers all hermaphrodite, or the lower ones female; spathe boat-shaped, rostrate, deciduous; spadix shorter than the spathe, dense-flowered, cylindrical, elongate-stipitate. Leaves

Rhodospatha—*continued.*

distichous, elliptic-oblong, acuminate, with numerous arcuate, parallel nerves; petioles about as long as the leaves, long-sheathed. The species introduced thrives in a compost of sandy loam and peat, and requires a moist atmosphere. Propagated by seeds, or by cuttings.

R. blanda (charming). *fl.*, spathe greenish-ochre; spadix rather long-stalked, cylindroid, loosely attenuated towards the apex. *l.* oblong-elliptic, slightly obtuse at base, loosely arcuate and narrowed towards the apex, acute. Brazil, 1860.

RHODOSTACHYS (from *rhodon*, a rose, and *stachys*, a flower-spike; alluding to the rose-coloured flowers of some species). SYN. *Ruckia*. ORD. *Bromeliaceæ*. A small genus (six or seven species have been described) of stove herbs, natives of Chili, Columbia, and Guiana. Flowers sub-sessile, on an hemispherical or shortly conical receptacle; sepals distinct above the ovary, erect, closely imbricated; petals free, imbricated, glandular, or with two small scales at the base within; heads terminal, sessile within an involucre of numerous floral leaves. Leaves rosulate, long-linear, slightly rigid, spinuloso-serrate. The only species introduced require culture similar to **Bromelia** (which *see*).

R. andina (Andine). *fl.* soft rose-colour, crowded on a hemispherical receptacle, each subtended by an oval-oblong, cucullate, cuspidate, toothed, bract. Summer. *l.* 1ft. to 1½ft. long, margined with robust spines, numerous, rigid, thick, fleshy, glaucous-green, powdered with white, arranged in a dense, regular rosette. *h.* 1ft. Andes of Chili, 1850. (R. H. 1885, 540.) SYNS. *Bromelia carnea*, *B. longifolia* (of Lindley) (L. & P. F. G. ii. 65). *R. grandiflora* and *R. littoralis* are probably only forms of this species.

R. bicolor (two-coloured). *fl.* rose-colour; inflorescence close, sessile, surrounded by a tuft of linear-ensiform, channelled, recurved, spiny-edged leaves. 1851. An interesting, almost stemless perennial. The following are probably slight forms: *Bromelia bicolor* (B. H. 1873, 14), *B. Joinvillei* (R. H. 1876, 10), *Hechtia pitcairniæfolia* (R. H. 1868, 211), *Ruckia Ellemeeti* (R. G. 571).

RHODOSTOMA. Included under **Palicourea** (which *see*).

RHODOTHAMNUS (from *rhodon*, a rose, and *thamnos*, a shoot or branch; alluding to the rosy colour of the flowers). ORD. *Ericaceæ*. A monotypic genus. The species is a small, hardy, branched shrub, in inflorescence and habit resembling **Azalea** (which *see* for culture).

R. Chamæcistus (Chamæcistus).* *fl.* pink, sub-erect, solitary at the tips of the branchlets, on long, slender peduncles; corolla rotate, nearly lin. in diameter. May. *l.* scattered, shortly petiolate, elliptic-lanceolate, entire, setose-ciliated, evergreen, shining. Branchlets glabrous. *h.* 6in. Alps of Eastern Europe, 1786. (B. M. 488, under name of *Rhododendron Chamæcistus*.)

RHODOTYPOS (from *rhodon*, a rose, and *typos*, a type or model; the flowers resemble those of a Rose). ORD. *Rosaceæ*. A monotypic genus. The species is a hardy shrub, allied to **Kerria** (which *see* for culture).

R. kerrioides (Kerria-like).* White Kerria. *fl.* white, solitary, ample, terminating the branchlets, shortly pedicellate; calyx persistent, villous within; petals four, ample, orbiculate, shortly clawed. April. *l.* decussately opposite, petiolate, simple, ovate, acuminate, argutely serrated, silky beneath; stipules free, membranous. Branches decussate, twiggy. *h.* 15ft. Japan, 1866. (B. M. 5805; R. G. 505; R. H. 1866, Fig. 54, S. Z. F. J. 99.)

RHOEO (name not explained by its author). ORD. *Commelinaceæ*. A monotypic genus. The species is a stove, perennial herb, often classed under **Tradescantia** (which *see* for culture).

R. discolor (party-coloured).* *fl.* blue or purple, almost included within the bracts, many, umbellately-crowded; sepals and petals three, free; peduncles axillary, sometimes divided. June. *l.* much imbricated, rather large, narrow-lanceolate, sessile, and sheathed at base, often purplish beneath. Stem short, or wanting. Central America. (B. M. 1192, 5079; F. d. S. 1169-70 and Ref. B. 48, under name of *Tradescantia discolor*.)

RHOMBOID. Approaching a rhomb in shape; quadrangular, with the lateral angles obtuse. A Rhomboid leaf is shown at Fig. 370.

FIG. 370. RHOMBOID LEAF.

RHOPALA. A synonym of **Roupala** (which *see*).

RHOPALOSTIGMA (of Schott). Included under **Staurostigma** (which *see*).

RHOPALOSTYLIS (from *rhopalon*, a club, and *stulos*, a pillar; alluding to the club-shaped spadix). ORD. *Palmæ*. A small genus (two species) of greenhouse, unarmed palms, with mediocre, annulate trunks, natives of New Zealand and Norfolk Island. Flowers mediocre, spirally disposed; spathes two, complete, oblong, complanate, the lower one two-winged; spadices short, spreading, on very short and thick peduncles, the branches somewhat flabellate, rather thick, and dense-flowered; bracts subulate at apex; bracteoles scale-like. Fruit small or rather large, ellipsoid, smooth. Leaves terminal, equally pinnatisect; segments equidistant, numerous, narrow-ensiform, acuminate, recurved, but not thickened at the margin and base; petioles very short; sheath elongated. For culture, *see* **Areca.**

FIG. 371. RHOPALOSTYLIS BAUER.

R. Baueri (Bauer's).* *fl.*, spathes white, 8in. to 10in. long, 3in. to 4in. across, narrow-oblong, acuminate; spadix axillary, "but, owing to the falling away of the leaf as soon as the spathe is ready to open and the flowers are fully formed, only flowering when infraaxillary, horizontally spreading from the caudex, 1ft. to 2ft. long, sparingly branched" (Hooker). *l.* 6ft. to 9ft. long, pinnate, furfuraceous-scaly on the rachis, costa, and nerves; pinnules closely set, 2ft. long, 1½in. broad, stiff, acuminate, ribbed and plaited. Trunk 20ft. high and 4in. in diameter. Norfolk Island. See Fig. 371. (B. M. 5735, under name of *Areca Baueri*.)

R. sapida (savoury).* *fl.* pale pink, very numerous; spadix much-branched, dense-flowered, 1½ft. to 2ft. long, inclosed in a double, boat-shaped spathe. *l.* pinnate, 4ft. to 6ft. long; pinnules very narrow, linear-lanceolate, with replicate margins; nerves and costa, and especially the petioles, covered with minute, lepidote scales. Trunk 20ft. high, 6in. to 8in. in diameter. SYNS. *Areca sapida* (B. M. 5139), and *Kentia sapida* (of gardens).

RHOPALOSTYLIS (of Klotzsch). Now included under *Dalechampia*.

RHUACOPHILA. A synonym of *Dianella*.

RHUBARB (*Rheum*). Rhubarb is a well-known, hardy perennial, cultivated in nearly every garden. Its leaf-stalks are used, either in a blanched or natural state, in pies, tarts, &c.; they also form material for making an excellent preserve, and for Rhubarb wine. The latter is, however, considered a very unwholesome beverage, even injurious to many constitutions.

CULTIVATION. Plants may readily be raised from seeds, which should be sown in spring, on a gentle hot-bed, the seedlings being afterwards transferred, when large enough, to the open ground. The method of increase generally practised, and one by which strong plants can be obtained in a much shorter time, is that of dividing up the roots, so that a crown is reserved for each piece. When a new plantation is in course of formation, it should be attended to as early as possible in spring. The ground should be previously deeply trenched and manured, and single-crown divisions, or seedlings, may be planted about 3ft. apart each way, the crowns being kept slightly above the surface. Rhubarb succeeds best in a rich, rather light soil, and in a light, open situation; but it grows freely under fruit-trees, as instanced by the quantities obtained in spring from market gardens. None of the leaves or stalks should be pulled during the first season; this would unduly weaken the rootstock. The second year a fair supply will be obtainable, and a good crop the third. A Rhubarb plantation will last good for several years, if an annual top-dressing of manure be given during winter; but it is well to renew it after about four or five seasons. Some full-grown "sticks" of Rhubarb are represented in Fig. 372.

FIG. 372. STICKS OF RHUBARB.

Forcing. Forced Rhubarb is usually much esteemed during winter and early spring; for market, it proves one of the most remunerative of crops. There are various methods adopted for procuring a supply, all of which are more or less successful. Where sufficient plants are at command, some may be lifted and placed in cellars,

Rhubarb—*continued.*

mushroom-houses, or any structure where there is a temperature of about 55deg. or 60deg.; if subjected to a strong heat before growth commences, the rootstocks are liable to decay. Plants about three years old are best for forcing, but, where such are not at command, older ones will do, though the crowns will most likely not start so readily, nor will the leaf-stalks be so strong. Forcing under glass, or in a mushroom-house, is by far the most satisfactory plan where it can be carried out; all that is necessary is to place the roots nearly close together, scatter a little soil amongst them and over the tops, and water occasionally. In the open ground, Rhubarb forcing may be conducted by placing large flower or seakale-pots, boxes, &c., over the roots where they have been growing, and burying them with a good depth of fermenting material, composed of stable litter and leaves. Forcing may commence indoors about November; a supply would not be readily obtained outside at that season, as the necessary heat could not be so steadily maintained.

SORTS. Of these, the following are amongst the best in cultivation:

CHAMPAGNE (Hawke's), early, deep red; an excellent variety for general culture, good in all respects. EARLY RED, one of the best early varieties, much grown in market gardens; the leaves are shining and somewhat glaucous. GOLIATH or MONARCH (Stott's), vigorous; leaf-stalks broad and very large. LINNÆUS (Myatt's), a good early sort of fine quality, excellent for forcing. PARAGON (Kershaw's), very distinct; stalks well formed and firm; early. SCARLET DEFIANCE (Baldry's), stalks crimson; leaves large; a good second early sort. VICTORIA (Myatt's), stalks very large and thick, of good quality; a well-known and excellent variety for summer use.

RHUS (from *Rhous*, the old Greek name of the genus used by Theophrastus). Sumach. Including *Lithræa*. ORD. *Anacardiaceæ*. A genus comprising about 120 species of stove, greenhouse, or hardy trees or shrubs, mostly possessing poisonous properties in a greater or lesser degree; they are found in the temperate regions of both hemispheres, being especially abundant at the Cape of Good Hope, but rarely occur within the tropics. Flowers small, polygamous, in axillary and terminal, bracteate panicles; calyx four to six-parted, persistent, the segments imbricated; petals four to six, equal, much spreading, imbricated; stamens four, five, six, or ten. Drupes small, dry, compressed. Leaves alternate, simple, one to three-foliolate, or impari-pinnate; leaflets entire or serrate. "Some American species, such as *R. venenata* and *R. Toxicodendron*, produce effects almost rivalling those once fabulously imputed to the Upas-tree of Java (*Antiaris*), the hands and arms, and sometimes even the whole body, becoming greatly swollen from simply touching or carrying a branch of one of these plants, and the swelling being accompanied with intolerable pain and inflammation, and ending in ulceration. These effects, however, are not felt by everyone, some people being able to handle the plants with impunity" (Lindley and Moore). *R. Coriaria* affords the sumach or shumac of commerce. From *R. Cotinus* the yellow dyewood called Young Fustic is obtained. A selection of introduced species (which are hardy, deciduous shrubs, except where stated otherwise) is given below. The greenhouse kinds will grow in any soil, and may be increased by ripened cuttings, inserted in sand, under a hand glass. The hardy species are very suitable for shrubberies. Some of them propagate freely by cuttings of the roots, and others by cuttings and layers.

R. aromatica (aromatic). *fl.* pale yellow, in clustered, scaly-bracted, catkin-like spikes, preceding the leaves. April and May. *l.* pubescent when young, thickish when old, sweet-scented when crushed; leaflets three, rhombic-ovate, unequally cut-toothed, the middle one wedge-shaped at base. *h.* 8ft. North America, 1773. SYN. *R. suaveolens.*

R. atomaria (undivided). A synonym of *R. villosa.*

R. caroliniana (Carolina). A synonym of *R. glabra.*

R. coccinea (red). A synonym of *R. glabra.*

Rhus—*continued.*

R. copallina (gum-copal). *fl.* greenish-yellow, in a terminal, thyrsoid panicle. July. *l.*, petioles wing-margined between the nine to twenty-one oblong or ovate-lanceolate, often entire leaflets, which are oblique or unequal at the base, smooth and shining above. Branches and stalks downy. *h.* 1ft. to 7ft. North America, 1688. Shrub with running roots.

R. Coriaria (hide-tanning). *fl.* whitish-green, in large, loose panicles. July and August. *l.* villous; leaflets eleven to fifteen, elliptic, with large, blunt teeth, becoming purplish-red in decay. *h.* 15ft. to 20ft. Portugal to Tauria, 1629. Shrub or low tree. (W. D. B. 135.)

R. Cotinus (Cotinus).* Smoke Plant. *fl.* pale purplish or flesh-colour, in loose panicles; pedicels becoming lengthened and hairy after flowering. June and July. *l.* obovate, undivided. *h.* 6ft. to 8ft. Spain to Caucasus, 1656. Shrub rambling. (J. F. A. 210.)

R. C. pendula (weeping). A form with pendulous branches.

R. diversiloba (variously-lobed). *l.* smaller than in *R. Toxicodendron*; leaflets ovate, very obtuse, obtusely lobed on the anterior margins. Branchlets short. *h.* 15ft. California. Erect tree. (B. R. 1845, 38.)

R. elegans (elegant). A synonym of *R. glabra.*

R. glabra (glabrous).* *fl.*, males greenish-yellow, females greenish-red, paniculate. June. *l.* glabrous; leaflets seventeen to twenty-one, lanceolate-oblong, serrate, whitish beneath. Branches glabrous. *h.* 5ft. to 18ft. North America, 1726. Shrub or low tree. (W. D. B. 15; T. S. M. 572.) SYNS. *R. caroliniana, R. coccinea, R. elegans* (W. D. B. 16), *R. sanguinea.*

FIG. 373. RHUS GLABRA LACINIATA.

R. g. laciniata (torn).* Fern-leaved Sumach. A very elegant variety, having leaves cut in a laciniate manner. See Fig. 373. (R. H. 1863, 7.)

R. javanica (Javan). A synonym of *R. semialata Osbeckii.*

R. lucida (clear). *fl.* white; panicles axillary and terminal, shorter, or a little, longer, than the leaves. July. *l.* shortly petiolate; leaflets sessile, obovate, quite entire, very blunt, somewhat emarginate, quite smooth, glossy. *h.* 4ft. to 6ft. Cape of Good Hope, 1697. Greenhouse.

R. sanguinea (bloody). A synonym of *R. glabra.*

R. semialata Osbeckii (half-winged, Osbeck's).* *l.* large; leaflets fifteen to twenty-three, oval, toothed, whitish-woolly beneath. Bark smooth. *h.* 20ft. Japan, 1867. Greenhouse. (R. H. 1867, 111, under name of *R. Osbeckii.*)

R. suaveolens (sweet-smelling). A synonym of *R. aromatica.*

R. succedanea (substituting).* Red Lac Sumach. *fl.* greenish-yellow. June and July. *fr.* white, the size of a cherry, containing a smooth nut. *l.* smooth, permanent, on wingless petioles; leaflets eleven to fifteen, ovate-lanceolate, taper-pointed, shining, netted with veins, and glaucous beneath. *h.* 10ft. to 15ft. Japan, 1768. Greenhouse evergreen.

R. Toxicodendron (poison-tree).* Poison Ivy; Poison Oak. *fl.* greenish-yellow, in loose, slender, axillary panicles. June. *l.*, leaflets three, rhombic-ovate, mostly pointed, and rather downy beneath, variously notched, sinuated, or cut-lobed. North

Rhus—*continued.*

America, 1640. Shrub climbing by rootlets over rocks, &c., or ascending trees, poisonous to the touch. (A. F. B. ii. 556; T. S. M. 577.)

R. T. radicans (rooting). *l.* mostly entire or nearly so. Stems rooting, but not climbing. (B. M. 1806, under name of *R. T. vulgare*.)

R. typhina (fever).* Stag's-horn Sumach; Vinegar-tree. *fl.* greenish-yellow, in a terminal, thyrsoid panicle. June. *l.*, leaflets eleven to thirty-one, pale beneath, oblong-lanceolate, pointed, serrate, rarely laciniate. Branches and stalks densely-velvety hairy. *h.* 10ft. to 30ft. North America, 1629. Shrub or tree. (T. S. M. 571.) *R. viridiflora* (green-flowered) is a male-flowered form of this species.

R. t. arborescens (arborescent). *l.* slightly downy beneath. *h.* 10ft. to 25ft. Tree.

R. t. frutescens (shrubby). *l.* downy and whitish beneath. *h.* 2ft. to 10ft. Shrub.

R. venenata (poisonous). Poison Elder, Sumach, or Dogwood. *fl.* green, in loose and slender axillary panicles. July. *l.* rather glabrous than pubescent; leaflets seven to thirteen, obovate-oblong, entire. *h.* 6ft. to 18ft. North America, 1713. The most poisonous species of the genus. (T. S. M. 575; W. D. B. 19.) SYN. *R. vernix.*

R. vernicifera (varnish-bearing). Japan Lacquer or Varnish-tree. *fl.* greenish-yellow. June. *l.* long, resembling those of a Walnut; leaflets eleven or thirteen, elliptic, acute, quite entire, smoothish above, but velvety beneath from pubescence. Branchlets and stalks clothed with soft down. *h.* 30ft. Japan, 1823. Tree.

R. vernix (varnish). A synonym of *R. venenata.*

R. villosa (villous). *fl.* greenish-yellow; racemes axillary, much shorter than the leaves, the terminal ones paniculate, somewhat longer. July. *l.* petiolate; leaflets sessile, obovate, obtuse, mucronulate, entire, 1in. to 1½in. long, ½in. to 1in. wide, with revolute margins, hairy or villous on both surfaces, as well as the petioles and branchlets. Cape of Good Hope, 1714. Greenhouse evergreen shrub or tree. SYN. *R. atomaria.*

RHYNCHADENIA. A synonym of **Macradenia** (which *see*).

RHYNCHANTHERA (from *rhynchos*, a beak, and *anthera*, an anther; the anthers are beaked). ORD. *Melastomaceæ.* A genus of about two dozen species of glandular or pilose, often bristly, stove, annual or perennial herbs or shrubs, natives of Brazil, Guiana, New Grenada, and Peru. Flowers purple, panicled, often large, showy; calyx tube ovoid or campanulate; lobes five, subulate, lanceolate, or bristly, often persistent; petals obovate; stamens ten, very unequal. Leaves ovate, cordate, or oblong. The only species introduced—*R. grandiflora*—is a handsome, stove, evergreen shrub. It requires a compost of rich, sandy peat and fibry loam. Ample drainage is essential. Propagation may be effected by cuttings, inserted in sandy loam, in heat, and covered with a bell glass, which should be slightly raised, in order to permit free circulation, and, at the same time, to prevent damping off.

R. grandiflora (large-flowered). *fl.* numerous, terminal, shortly pedicellate; calyx tube purple, shorter than the narrow teeth, panicle dichotomously branched, corymbiform. Autumn. *l.* rather large and long-stalked, cordate-ovate, shortly acuminate, serrulated, seven to nine-nerved, slightly bristly. Branches subterete, hairy, or sometimes slightly hispid. *h.* 6ft. North Brazil, 1873. (B. M. 6011.)

RHYNCHITES. A genus of Weevils, noteworthy for the harm done by several of the species to trees. Some of them have the habit of rolling part of a leaf, or one or more leaves, into a cone, to supply protection and food to the larvæ. The cones hang in a withered state by the half-cut stalks or midribs of the leaves. Others gnaw partly through young shoots, or young fruit, and lay one or more eggs in each, and the larvæ feed in the withered branch or fruit. By the time the larva is full-fed, the part of the plant containing it has usually fallen off, and the larva crawls into the earth, there becomes a pupa, and, finally, the beetle emerges, generally in the following spring. The beetles are harmful also by gnawing the young leaves and branches of most kinds of trees, including fruit-trees, for their own food. They are all small, usually being from ⅛in. to ¼in. long. The general outline is broadly pear-

Rhynchites—*continued.*

shaped, the wing-cases being rather square in front, and broader than the thorax. The head bears a rather long, decurved beak, on the middle of which are the straight, clubbed antennæ. The beetles are all shining dark blue, green, brown, or coppery-red in colour. Reference has already been made to these insects as injurious to Pear-trees, Plum-trees, &c. The following are the most hurtful species:

R. Alliariæ is much like *R. conicus* in size and colour, but the thorax is finely pitted, and has a smooth dorsal line, and the elytra are not decidedly wider behind the middle. The larvæ live in the stalks and midribs of the leaves of many fruit-trees, *e.g.*, Apple, &c.

R. Bacchus is ¼in. to ⅓in. long, purple-red, with a golden-coppery gleam on the wing-cases and on the back of the neck; beak, legs, and antennæ are blue-black; wing-cases deeply punctured, and transversely wrinkled. This species prefers Apple and Pear trees, but is not restricted to them. The larvæ live in the still unripe fruits, which are hindered and interfered with in their growth.

R. betuleti is about ⅓in. long, or more, entirely blue or shining green, or a combination of these, and hairless; wing-cases closely punctate, irregularly striate, not wrinkled. The beetles live on many kinds of trees, but prefer, among those of gardens, Pear-trees and Vines. The females make conical habitations for the larvæ out of one or several leaves rolled together, and caused to wither by their stalks being partly gnawed through, as stated above.

R. conicus is from ⅛in. to ⅙in. long; colour deep blue, sometimes with a greenish tinge; beak and limbs black; thorax coarsely pitted; wing-cases deeply punctate-striate, broadest *behind* the middle. In May and June, the females lay eggs in the young shoots of Apples, Pears, Plums, Cherries, and other fruit-trees, and then gnaw the branches partly through below the situation of the eggs. The branches fade and hang down, and in this state form the proper food of the larvæ, which feed in the pith.

R. cupreus is about ⅛in. or ¼in. long, and is coppery or bronze-coloured, with a thin coat of greyish hairs; the beak and limbs are black; the thorax is closely punctured; the elytra are deeply punctate-striate, with the interspaces transversely wrinkled. The beetles live on all kinds of fruit-trees in early summer, and do considerable harm by gnawing the young shoots and buds; but they prefer Cherries and Plums. The females seek out the young fruits, and deposit an egg in a hole bored in each, after the stalk is gnawed half through, so that, after a time, the fruits fall to the earth. The larvæ feed in the fruits till ready to enter the soil, there to become pupæ.

A beetle of this genus, *R. bicolor*, injures Roses in the United States.

Remedies. These consist of the capture of the beetles by shaking the trees over trays tarred inside, and the removal of the conspicuously injured leaves, young branches, or fruits, to be burned as soon as convenient. Fortunately, the evil can be checked, in most cases, without serious labour.

RHYNCHOGLOSSUM (from *rhynchos*, a beak, and *glossa*, a tongue; the lower lip of the flower is in the form of a tongue-like beak). SYNS. *Antonia*, *Loxotis.* ORD. *Gesneraceæ.* A genus of one or two species of closely-related, erect, slightly-branched stove herbs, broadly dispersed over the East Indies and the Malayan Archipelago. Flowers blue, rather large, shortly pedicellate, pendulous; calyx broadly tubular-campanulate, shortly five-fid; corolla tube cylindrical, loosely incurved; limb bilabiate, the dorsal lobe shortly bifid, the anterior one much larger and trifid, the lateral ones shorter;

Rhynchoglossum—*continued.*

racemes terminal, or at length opposite the leaves, secund, loose. Leaves alternate, ample, membranous, very unequilateral. *R. zeylanicum* is a pretty annual, or at most biennial, requiring culture similar to **Klugia** (which *see*).

R. zeylanicum (Cingalese). *fl.* in long, terminal, sometimes interrupted, sometimes leafy, racemes; corolla blue, paler and almost white beneath, with a little yellow. July. *l.* alternate, petiolate, somewhat ovate, entire, closely penninerved. *h.* about 1ft. Ceylon, 1844. (B. M. 4198.)

RHYNCHOPETALUM. Included under **Lobelia** (which *see*).

RHYNCHOSIA (from *rhynchos*, a beak; alluding to the shape of the keel). ORD. *Leguminosæ*. A genus comprising about seventy-five species of stove or greenhouse, twining, prostrate, or rarely erect herbs, shrubs, or sub-shrubs, inhabiting warm regions. Flowers yellow, the standard often darkly lined, rarely purple, in axillary racemes, rarely solitary in the axils; two upper calyx lobes more or less connate; standard obovate or orbicular, spreading or reflexed; keel incurved at the apex. Leaves pinnately, or rarely sub-digitately, trifoliolate, exstipellate or minutely stipellate; leaflets resinous-dotted beneath. The species are of no great beauty; only four call for mention here. They thrive in a light, sandy soil, and may be propagated by seeds.

R. Chrysoscias (Chrysoscias). *fl.* golden-yellow or orange; standard ample; peduncles three or four-flowered at the summit. May. *l.* on very short petioles; leaflets 1½in. long, oblong-lanceolate, with revolute margins, dark-coloured above, fulvescent beneath. South Africa, 1871. Climbing, greenhouse sub-shrub, covered on the younger portions with gold or tawny hairs. (B. M. 5913.)

R. cyanosperma (blue-seeded). *fl.*, corolla bright red-purple, equalling the calyx. Summer. *l.*, leaflets three, leathery; central one roundish, 4in. to 5in. long, cuspidate, with a petiolule ½in. long; lateral ones unequal-sided; upper surface thinly, lower densely, grey-pubescent. Tall, shrubby climber. Tropics.

R. c. albiflora (white-flowered). *fl.* yellowish-white. April. *l.* acuminate, with a very long acumen. Climbing, stove sub-shrub. (B. M. 1859, under name of *Cylista albiflora*.)

R. gibba (tumid). *fl.*, standard ovate, streaked with brown; peduncles 3in. to 4in. long, floriferous above the middle. September and October. *l.* on rather long petioles; leaflets variable, sometimes almost orbicular and very obtuse, sometimes rhomboid, acuminate, the lateral ones very unequal-sided, ½in. to 1½in. long and broad. Stems climbing or trailing, densely pubescent. South Africa. Greenhouse shrub. (B. R. 275, under name of *Glycine caribæa*.)

R. phaseoloides (Phaseolus-like). *fl.*, standard striped with purple; racemes many-flowered. June and July. *l.*, leaflets ovate or ovate-rhomboid, pointed. Stem suffruticose, twining, sub-cylindrical. West Indies, 1818. Stove. (B. M. 2284, under name of *Glycine phaseoloides*.)

RHYNCHOSPERMUM (of Lindley). A synonym of **Trachelospermum** (which *see*).

RHYNCHOSTYLIS (from *rhynchos*, a beak, and *stulos*, a pillar; alluding to the shape of the column). ORD. *Orchideæ*. A small genus (two or three species) of stove, epiphytal orchids, natives of the East Indies and the Malayan Archipelago. Flowers rather large or mediocre, shortly pedicellate; lateral sepals broader than the dorsal one; lip affixed to the column, profoundly saccate at base, with obsolete, lateral lobes; column short, thick; racemes lateral, long, dense-flowered. Leaves distichous, coriaceous or fleshy, flat; sheaths persistent, concealing the stem. For culture of *R. retusa*, the best-known species, *see* **Saccolabium.**

R. retusa (retuse).* *fl.* white, striped with violet-pink; petals half as wide as the ovate sepals; lip one-coloured, with a compressed, truncate-conical spur, the lamina lanceolate, inflexed, slightly costate at back; racemes cylindrical, dense. *l.* 1ft. long, channelled, unequally truncate. East Indies, 1820. A pretty species. SYNS. *Saccolabium Blumei* (L. S. O. 47), *S. guttatum* (B. M. 4108), *Sarcanthus guttatus* (B. R. 1443).

RHYNCHOTECHUM (name not explained by its author). SYNS. *Cheilosandra*, *Chiliandra*, *Coryxanthera*. ORD. *Gesneraceæ*. A genus comprising about half-a-dozen

Rhynchotechum—*continued.*

species of villous, hairy, or woolly, stove sub-shrubs, natives of the East Indies and the Malayan Archipelago. Flowers pink or white, small; calyx of five narrow segments; corolla with a short, broadly campanulate tube, and a sub-bilabiate limb; cymes pedunculate in the axils or defoliated nodes, often bundle-flowered, densely or loosely trichotomous. Leaves ample, opposite or rarely ternately whorled. Only one species has yet been introduced. For culture, *see* **Gesnera.**

R. ellipticum (elliptic-leaved). *fl.* of a deep rose-colour, small, disposed in crowded, axillary corymbs. Summer. *l.* opposite, obovate-elliptic. Stem simple, erect, 2ft. to 3ft. high. Assam and Sikkim, 1870. (B. M. 5832.)

RHYNCOPERA. Included under *Pleurothallis*.

RHYSOSPERMUM. A synonym of **Notelæa** (which *see*).

RHYTIDANDRA. A synonym of **Marlea** (which *see*).

RHYTIDOPHYLLUM (from *rhytis*, *rhytidos*, a wrinkle, and *phyllon*, a leaf; alluding to the rugose leaves). ORD. *Gesneraceæ*. A genus comprising about ten species of villous or white-woolly, rarely almost glabrous, stove shrubs or small trees, natives of the West Indies and Columbia. Flowers often softly villous or woolly; calyx tube adnate, turbinate, or nearly hemispherical; corolla usually greenish outside, variously coloured within; tube incurved, enlarged above; limb of short, broad, erecto-patent lobes; peduncles axillary, elongated, cymosely many-flowered. Leaves alternate, shortly petiolate, often elongated, entire or crenate, softly rugose or scabrous, sometimes very scabrous and woolly beneath. Only two species have been introduced. For culture, *see* **Gesnera.**

R. auriculatum (eared). *fl.* greenish, red-spotted within; corolla sub-campanulate, hairy; peduncles almost equalling the leaves, glandular-tomentose. August. *l.* sessile, narrowed at base and auriculate, dilated and semi-amplexicaul, serrated, tomentose-scabrous above, slightly hoary beneath. *h.* 1ft. Brazil, 1824. (B. M. 3562.)

R. tomentosum (tomentose). *fl.*, corolla greenish-yellow, variegated with purple spots, or purple, ¾in. long, scabrous-tomentose; peduncles equalling or exceeding the leaves. Summer. *l.* lanceolate or oblong-lanceolate, 4in. to 8in. long, acuminate, serrate, scabrous above, villous beneath. *h.* 2ft. to 3ft. West Indies. (B. M. 1023, under name of *Gesneria tomentosa*).

RHYTIGLOSSA. A synonym of *Dianthera*.

RHYTISMA. A genus of Fungi which make their appearance upon the leaves and branches of Maples, certain Willows, and a few other plants, in the form of shining, deep black patches, rising a little above the general level of the part bearing them. The most generally known species is that which gives rise to the large black spots so common in autumn upon the leaves of *Acer campestre*, or Field Maple, and of *Acer Pseudo-platanus*, the Sycamore of England, the Plane of Scotland. These spots, in their common form, are often ½in. or more in breadth, and are of a uniform tint. The Fungus is known as *R. acerinum*. A variety called *R. punctatum* differs from this in having the spots broken up into a number of small black specks instead of a uniform black patch. In autumn, there is no sign of reproductive organs on the Fungus; but if a patch is examined in spring, after the leaf has lain on the moist ground all winter, there are found imbedded in the mass numerous asci, each inclosing eight slender spores.

The remedy is easy, and consists in the careful removal of the diseased leaves, as is done in well-kept gardens and pleasure-grounds. In such places, this disease is of rare occurrence compared with its abundance in most other localities. Its presence renders the leaves unsightly, but is not dangerous to them.

RIB. A primary and strong vein, or conspicuous portion of the framework, of a leaf.

RIBBON GRASS. *See* **Phalaris arundinacea variegata.**

RIBBON-TREE. *See* **Plagianthus.**

RIBES (an Arabic name, properly belonging to a species of *Rheum; Grossularia* was, according to Dr. Asa Gray, the proper name to have been adopted for the genus). Currant; Gooseberry. Including *Calobotrya*, *Chrysobotrya*, and *Grossularia*. ORD. *Saxifrageæ*. A genus comprising about fifty-six species of hardy, deciduous shrubs, often resinous-glandular, unarmed, or with spines beneath the axils or scattered; they are natives of Europe, temperate Asia and America, and the Andes of South America. Flowers white, yellow, red, or green, rarely purple, often unisexual by abortion, racemose or sub-solitary; calyx tube ovoid or spherical, adnate to the ovary; limb tubular or campanulate, four or five-fid, often coloured, the lobes erect or incurved, imbricated or sub-valvate; petals four or five, inserted at the throat of the calyx, small, scale-like, usually included; stamens four or five, inserted with the petals; pedicels bracteate at base and bibracteolate in the middle. Berries oblong or globose, pulpy, crowned by the calyx, one-celled, many-seeded. Leaves scattered, often fascicled, petiolate, simple, entire or often lobed, crenate, or cut, plicate or convolute in vernation; stipules adnate to the petioles or wanting. A great many of the plants have been introduced; those best known in garden are described below. Four species are included in the British Flora. Spring is the flowering period. There is but little difficulty in propagating and growing any of the species. They root readily from cuttings or layers, and succeed in almost any ordinary garden soil. *See also* **Currant** and **Gooseberry.**

FUNGI. These are not, on the whole, very destructive to the shrubs of this genus. The dead roots and stems provide suitable food for *Nectria Ribis*, and for other *Pyrenomycetes*; but these need not be discussed here. The living leaves of Gooseberries frequently, and of Currants occasionally, show orange or reddish, swollen spots, on which are numerous little pits or cups, filled with the small spores of *Æcidium Grossulariæ*. This Fungus also attacks the fruits, and may do a good deal of harm, but is not usually very injurious. The diseased leaves and fruits should be picked off as soon as the orange spots are observed. Less often, the leaves bear small, dark brown masses, which, on examination with the microscope, are found to be made up of brown spores, each consisting of two cells, and borne on a pale stalk attached to one end of the spore. This Fungus is named *Puccinia Ribis*. Another Fungus is common and destructive to the leaves of species of *Ribes* on the Continent of Europe. It appears in the form of yellow, raised spots on the lower surface of the leaves, often so numerous as almost to overspread them, and, in time, to destroy them. These spots are covered with the round, one-celled spores of *Cæoma Ribesii*.

The leaves of Gooseberries and of Currants are often marked with discoloured spots, which become dry and withered. In these are generally to be seen minute, black spots, which, under the microscope, are found to be pycnidia with minute sporidia. Those on Currants belong to forms known by the names of *Glœosporium Ribis* and *Septoria Ribis*, and those on Gooseberries have received the name of *Septoria Grossulariæ*. They are all, probably, young stages of true *Pyrenomycetes*, of which one, *Sphærella Ribis*, has been recorded from similar spots. These Fungi seldom do serious injury. The most successful treatment is to pick off and burn the leaves that show the spots, and the same holds good of the *Puccinia* and the *Cæoma* mentioned above. The leaves of Gooseberries are frequently covered with a thin, white coating, which, after a time, becomes studded with small, black grains, like gunpowder. This

is due to the growth of a **Mildew** (which *see*), known as *Microsphæra Grossulariæ*. The white coat is composed of the mycelium and conidia (*see* **Oidium**). The black specks are perithecia, which bear ten to fifteen transparent outgrowths, bifurcated about three times. Each perithecium incloses from four to eight asci, which contain four or five spores. Flowers of sulphur and solution of potassium sulphide, employed as advised under **Oidium**, are the best remedies, should any be needed.

INSECTS, &C. The animals most injurious to plants of this genus have been briefly treated of under the headings **Currant** and **Gooseberry**; and several of them have received somewhat fuller notice under the headings mentioned below. The young twigs of Currants are often bored into and killed by the larvæ of the **Currant Clearwing Moth** (which *see*). The infested branches may be detected by the drooping of the leaves, and should be cut off, with the larvæ in them, and burned.

FIG. 374. GOOSEBERRY AND CURRANT SAWFLY (*Nematus Ribesii*)—*a*, Lines to show actual spread of wings and length of body.

The buds of Black Currants (*R. nigrum*) are, in some localities, tenanted by Mites (*Phytoptus Ribis*), which cause them to enlarge, but destroy the shoots; and the bushes are thus rendered useless, and may be killed. The swollen buds should be removed, and destroyed; and, if the attack is severe, the bushes should be uprooted, and burned, and others should not be planted in the same soil for two or three years (*see* **Mites**).

The leaves of Gooseberries, and of Currants of several kinds, suffer very seriously from the attacks of the larvæ of the **Gooseberry or Magpie Moth** (which *see*); and, to a less degree, from those of the V-Moth (*Halia* or *Phalæna Wavaria*). The appearance of the former, and the remedies against the larvæ, are specified under the heading quoted above. The V-Moth also belongs to the Geometers, and resembles the Magpie Moth in form; but the spread of wings does not exceed 1¼in., and the colour is grey, with a purplish gloss, and brownish hind margins to the wings. Along the front margin, each fore wing bears numerous short streaks, and four spots of dark brown. The second spot joins with a dark spot in the centre of the wing, so as to form a V (hence the popular name of the moth), with its tip directed from the body. The moth appears in July; the larvæ are most conspicuous about May. They are cylindrical, with slight dilatations along the sides. The head is lead-coloured, with dark markings; and the body varies from dull green to lead-colour, but always shows wavy, smoke-coloured lines lengthwise, and a row of pale yellow spots along each side; in each

Ribes—*continued.*

spot are three black warts, each bearing a black bristle. The pupa is suspended in a slight web among the leaves on the bushes. The same remedies may be used against these insects as against the Magpie Moth.

Sawflies are frequently most hurtful to Gooseberries, and to Red and White Currants. (*See* **Gooseberry and Currant Sawfly** for a short account of *Nematus Ribesii*, the most hurtful species. But the account there given is so incomplete, that we supplement it here, in view of the very great damage often done by the larvæ to Gooseberry and Currant-bushes, which, at times, they completely strip of their leaves.) The insects (see Fig. 374) are clay-yellow, with three large, black marks on the back of the thorax, one on the breast, and others on the sides. The legs are pale, except dark tips to the last pair; the antennæ are dark. The wings are hyaline, with a black stigma. The body is ¼in. or ⅓in. long. The insects vary in the amount of black upon them, occasionally having even the abdomen almost black. The eggs are laid on the veins of the lower surface of the leaf, in which the young larvæ eat little holes at first; but, after a time, they devour the whole leaf, except the chief veins. The larvæ, till their last moult, are mostly green, studded with numerous black, shining

FIG. 375. LARVA OF GOOSEBERRY AND CURRANT SAWFLY (*Nematus Ribesii*).

tubercles, bearing hairs (see Fig. 375). The first and second, and the eleventh to thirteenth, segments are orange. The true legs are mostly black, and the claspers are pale green. In the last moult, the tubercles are thrown off, and the larvæ become uniform bluish-green, with an orange spot behind the head, and another on the tail. When full-fed, the larvæ drop to the ground, and an inch or two below the surface spin brown cocoons. Inside these may be found the pupæ, green or yellowish-green, with orange markings on the thorax and tip of the abdomen. There are usually two generations in the year.

Nematus appendiculatus is less often markedly injurious to Gooseberry and Currant-bushes; for, though widely diffused throughout Britain, it is not very common. This Sawfly is readily distinguished from *N. Ribesii* by its black abdomen, as well as by its more truncate front wings, rather smaller size, and other minor peculiarities. The larva is green, with a yellowish tint on the second and eleventh and anal segments, and on the posterior legs. The larvæ go below ground to pupate.

Nematus consobrinus also feeds, in the larval state, on the leaves of Gooseberries, and is not rare in Britain. It much resembles *N. Ribesii*, but is slightly smaller and duller-coloured, though it varies a good deal in the latter respect. The larva is green, beset with black tubercles, each bearing a hair; the second segment, the sides over the legs, and part of the last segment, are yellow. At the last moult, the body becomes uniform bright green, except that behind the head and on the

Ribes—*continued.*

last segment yellow is visible. There is only one generation annually in Britain.

Remedies are specified under the heading already quoted, and need not be repeated here. They are applicable to all three species of Sawflies, and are, indeed, useful against all the insects that feed exposed on the leaves.

Several species of Greenflies, or **Aphides** (which *see*), live on the lower surface of the leaves of Gooseberries and Currants, and frequently distort the young leaves at the tips of the branches, causing these, on the Currants especially, to become swollen and reddened. Besides the injury thus done to the plants, the fruit suffers from being covered with the sticky excretions of the insects, and with the dust and soot that adhere to these, and the Fungi that find suitable food in them. In Buckton's "British Aphides," the following are recorded as especially injurious, viz., *Myzus Ribis* (see Fig. 376) with cylindrical honey-tubes, and *Rhopalosiphum Ribis* with the honey-tubes widened in the middle. Both species are green, with dark markings. For remedies against these insects, *see* **Aphides.** The tips of the twigs bearing distorted leaves should be cut off and destroyed by fire, if practicable. Syringing the bushes with water afterwards is beneficial, by cleaning the leaves and fruits.

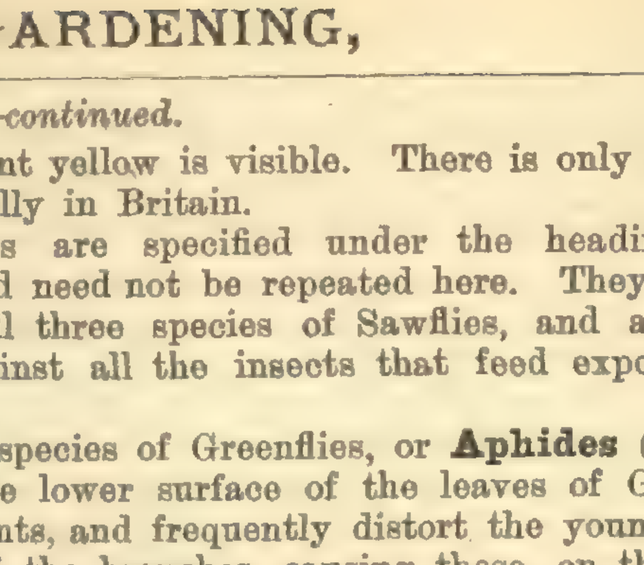

FIG. 376. APHIS (MYZUS) RIBIS.

The figure on the leaf shows the Wingless Female rather larger than natural size; the lower figure shows the Winged Female much enlarged.

On the Continent of Europe, of late years, a good deal of injury has been done by a Gall-midge, the larvæ of which feed in the flower buds, and destroy them. The insects have not yet been reared. This foe has not been recorded in Britain.

The fruits are sometimes injured by the larvæ of *Halia Wavaria* (*see* above); but the worst foes to them are birds, *e.g.*, blackbirds and thrushes. The loss from this cause is easily prevented by netting bushes of any choice varieties; but probably the plants benefit as much as they lose when left unnetted, inasmuch as it has been observed that bushes under nets are more liable than others to be injured by insects. It must be remembered, also, that the birds most apt to carry off the fruits of Gooseberries and Currants well repay such plundering by their services in destroying noxious insects, snails, and other marauders during the year, besides the pleasure derived from their song.

R. alpinum (alpine). Tasteless Mountain Currant. *fl.* yellowish; racemes erect, glandular-pubescent; males 2in. to 2½in. long, twenty to thirty-flowered; females shorter, eight to ten-flowered. *fr.* scarlet, ¼in. in diameter, insipid. *l.* 1½in to 2in. in diameter, broadly ovate, three to five-lobed; lobes usually three, acute, cut, and serrate, hairy. *h.* 3ft. Europe (Britain), &c. Unarmed shrub. (Sy. En. B. 519.)

R. a. japonicum (Japanese). *fl.* greenish, small, glomerulate *fr.* cherry-red. *l.* persistent, three-lobed, denticulate-crenate, strongly nerved. Branches divaricate. *h.* 3ft. Japan, 1877.

R. a. aureum (golden-leaved). A very dwarf, garden strain, with yellow flowers, well adapted for rockeries, &c. 1881.

Ribes—*continued.*

R. aureum (golden-flowered).* Buffalo Currant. *fl.* golden-yellow; petals much shorter than the calyx segments; racemes many-flowered. April and May. *fr.* yellow, seldom black, glabrous, of exquisite flavour. *l.* three-lobed; lobes divaricate, with a few deep teeth, shorter than the petioles, which are ciliated at the base. *h.* 6ft. to 8ft. North-west America, 1812. Glabrous, unarmed shrub. (B. R. 125.)

FIG. 377. FRUITING BRANCH OF RIBES GROSSULARIA.

R. a. præcox (early-flowering). *fl.*, racemes bracteate. *fr.* smaller, copious, turbinate. *l.* cuneate at base, pubescent beneath. The flowers and fruit appear earlier than in the type. (L. B. C. 1533, under name of *R. fragrans.*)

Ribes—*continued.*

with a mealy bloom; lobes bluntly toothed at the apex. *h.* 6ft. to 8ft. North America, 1812. (B. R. 1274.) In the form *fructu-nigro*, the berries change from yellow to red, and finally become deep blackish-purple; in *fructu-luteo*, they are always yellow.

R. Beatonii (Beaton's). A synonym of *R. Gordonianum.*

R. cereum (waxy). *fl.* white, three to five in a pendulous, pubescent raceme as long as the leaves; calyx segments reflexed. *fr.* red, glabrous. *l.* nearly round, obtusely trilobed, crenate, viscid. *h.* 3ft. North America, 1827. Unarmed shrub. (B. M. 3008; B. R. 1263; B. R. 1471, under name of *R. inebrians.*)

R. Cynosbati (Dog-Bramble). *fl.* green, two or three to a slender peduncle. *fr.* large, armed with long prickles like a burr, or rarely smooth. *l.* on slender petioles, slightly cordate, roundish, three to five-lobed, pubescent, 1in. to 2in. in diameter. *h.* 4ft. Stems spiny and commonly bristly. North America, 1759.

R. divaricatum (spreading-branched). *fl.* white, three on a drooping peduncle; calyx funnel-shaped. *fr.* black, smooth, spherical, of an agreeable flavour. *l.* roundish, three-lobed, deeply toothed, nerved, glabrous. Branches divaricate, bristly, at length naked; spines one to three together, axillary. *h.* 5ft. to 7ft. North America, 1826. (B. R. 1359.)

R. floridum (flowery).* American Wild Black Currant. *fl.* whitish, large; calyx tubular-campanulate, smooth; racemes drooping, downy. *fr.* black, smooth, round-ovoid, resembling the common Black Currant in smell and flavour. *l.* sprinkled with resinous dots, slightly heart-shaped, sharply three to five-lobed, doubly serrate. *h.* 4ft. North America, 1729. Unarmed shrub. SYNS. *R. missouriense* (of gardens), *R. pennsylvanicum.* The decaying foliage assumes a bright purplish-bronze colour in autumn, and the plant is then highly ornamental.

R. Gordonianum (Gordon's). A hybrid between *R. aureum* and *R. sanguineum*, intermediate between the two in all its characters. (F. d. S. 165.) SYNS. *R. Beatonii*, *R. Loudonii.*

R. gracile (slender).* *fl.* white, pendulous, about two together on peduncles; sepals reflexed; stamens very prominent. *fr.* deep rich purple, about ⅜in. in diameter, having a rich sub-acid, vinous, rather perfumed flavour. *l.* glabrous, roundish, entire at base, having in the outward part three crenately cut, blunt lobes. Branches prickly; prickles one, two, or three together. *h.* 4ft. to 5ft. North America, 1826. SYN. *R. niveum* (B. R. 1692).

FIG. 378. FRUITING BRANCH OF RIBES OXYACANTHOIDES.

R. a. serotinum (late-flowering). *fl.*, racemes naked, produced later than in the type. *fr.*, berries few, round. *l.* variable; lobes deeply serrate.

R. a. tenuiflorum (slender-flowered). *fl.* yellow. *fr.* purple or yellow, glabrous. *l.* roundish, three-lobed, covered, when young,

R. Grossularia (Grossularia).* Cat Berry; Wild Gooseberry. *fl.* greenish, drooping, ½in. in diameter; calyx lobes purplish, reflexed; peduncles one to three-flowered, short-pubescent, one to three-bracteate about the middle. *fr.* ½in. to 1in. in diameter. *l.* orbicular, glandular-hairy, three to five-lobed, 1in. to 2in. in

Ribes—*continued.*

diameter, fascicled on short, lateral branches, shining above; lobes irregularly crenate. Europe (Britain), &c. A small, spreading shrub, with one to three spines under the leaf-buds. See Fig. 377. (Sy. En. B. 518.) In the form *Uva crispa* (formerly regarded as a species), the ripe fruit is glabrous, and the leaves are smaller. There are many other varieties. For culture, &c., *see* **Gooseberry.**

R. hirtellum (slightly hairy). A synonym of *R. oxyacanthoides.*

FIG. 379. FLOWERING BRANCH OF RIBES SANGUINEUM.

R. lacustre (lake-loving).* *fl.* greenish-yellow; calyx broad and flat; racemes four to nine-flowered, slender, nodding. *fr.* bristly, small, unpleasant to the taste. *l.* heart-shaped, three to five-parted, with the lobes deeply cut. Young stems clothed with bristly prickles and weak thorns. *h.* 4ft. North America (in cold woods and swamps), 1812. (B. M. 6492.)

R. Lobbii (Lobb's). *fl.* drooping, two or three to a peduncle, large; calyx dark purple; limb of five segments, marked with lines of hairs; petals erect, almost white. April and May. *l.* small, cordate, three to five-lobed, glabrous above, downy beneath, sometimes glandular; petioles hairy. Branches harsh, rigid, beset with stipulary, spreading spines in threes or fours. *h.* 6ft. California. (B. M. 4931, under name of *R. subvestitum.*)

R. Loudonii (Loudon's). A synonym of *R. Gordonianum.*

R. missouriense (Missouri). A garden synonym of *R. floridum.*

R. multiflorum (many-flowered). *fl.* greenish-yellow, in very long, pendulous, drooping racemes. *fr.* red, small, and seldom produced. *l.* five-lobed, large, cordate, tomentose beneath. Branches vigorous, spreading, unarmed. *h.* 4ft. to 6ft. Eastern Europe, 1822. (B. M. 2368.)

R. nigrum (black).* Black Currant; Quinsy Berry. *fl.* green, ¼in. to ⅓in. in diameter; calyx campanulate, glandular; pedicels long; racemes drooping, loose-flowered, tomentose, eglandular. *fr.* black, ⅜in. in diameter, globose. *l.* 2in. to 3in. in diameter, five- to seven-lobed, similar to those of *R. rubrum*, but rather deeply lobed; petioles slender, pubescent. *h.* 5ft. Europe (Britain, but probably a garden escape). Unarmed shrub, emitting a strong odour when bruised. For culture, &c., *see* **Currant.**

R. niveum (snowy). A synonym of *R. gracile.*

R. oxyacanthoides (Hawthorn-like).* *fl.* greenish, one or more on a short peduncle. *fr.* red and green, or purplish-blue, small, of an agreeable flavour. *l.* glabrous, plaited; lobes toothed; petioles villous and a little hispid. Infra-axillary prickles larger and mostly solitary; smaller prickles scattered here and there. *h.* 2ft. to 3ft. North America, 1705. See Fig. 378. SYN. *R. hirtellum.*

R. pennsylvanicum (Pennsylvanian). A synonym of *R. floridum.*

R. punctatum (dotted). *fl.* yellowish-green; racemes pedunculate, pendulous, at first ovate, becoming oblong and looser. *fr.* small, glabrous. *l.* trilobed, serrated, shining yellowish-green, dotted beneath; petioles pubescent and ciliated. *h.* 3ft. Chili, 1826. A compact, shining, resinous shrub. (B. R. 1658.)

R. Roezlii (Roezl's). *fl.* solitary or in pairs, pendulous; calyx lobes red, lanceolate, revolute; petals white, linear-truncate, not spreading. *l.* roundish, sub-cordate, lobed. Branches armed at the nodes with trifid spines. *h.* 3ft. North-west America, 1879. (R. G. 982, Figs. 1-3.)

R. rubrum (red).* Wild Currant; Garnet Berry. *fl.* green, ¼in. in diameter; racemes 1in. to 3in. long, many-flowered, pubescent or glabrous, never glandular; bracts ovate. *fr.* red, acid, ¼in. in diameter. *l.* 2in. to 4in. in diameter, three to five-angled and lobed, cordate at base, glabrous or pubescent above, usually tomentose beneath; lobes triangular, crenate; petioles pubescent or bristly. *h.* 4ft. Europe (Britain), &c. Unarmed shrub. For culture, &c., *see* **Currant.**

R. r. album (white). A form with white berries.

Ribes—*continued.*

R. r. hortense (garden). *fr.* sweeter and larger than in *R. r. sylvestre.* *l.* large, sometimes variegated.

R. r. sativum (cultivated). *fl.* in glabrous, always drooping racemes. *fr.* globose. *l.* glabrous on both surfaces when mature. An escape from cultivation. (Sy. En. B. 520.)

R. r. spicatum (spiked). *fr.* contracted at the top. *l.* hairy above when young, and tomentose beneath. (Sy. En. B. 522.)

R. r. sylvestre (wood). *fl.* purplish; racemes pubescent, usually sub-erect when in flower, and drooping when fruiting. *fr.* contracted at the top. *l.* hairy above, tomentose beneath.

R. sanguineum (bloody-flowered).* Flowering Currant. *fl.* deep rose-colour; racemes drooping, pubescent, twice the length of the leaves. *fr.* purplish, with a glaucous bloom. *l.* cordate, somewhat five-lobed, serrated, veiny, smoothish above, clothed with villous tomentum beneath. *h.* 4ft. to 8ft. North-west America, 1826. Unarmed shrub. See Fig. 379. (B. M. 3335; B. R. 1349; L. B. C. 1487; S. B. F. G. ser. ii. 109; T. H. S. vii., p. 508.)

R. s. atro-rubens (dark-reddish). *fl.* much deeper and darker red, smaller, and in smaller racemes, than in the type.

R. s. glutinosum (glutinous). *fl.* very pale rose-colour; racemes rather larger than in the species. *l.* destitute of down, slightly viscous.

R. s. malvaceum (Mallow-like). *fl.* rather darker than in *R. s. glutinosum*, and having more of a lilac tinge, almost sessile; racemes short and close. *l.* rough and hispid on the upper side, clothed beneath with whitish, cottony down. (S. B. F. G. ser. ii. 340, under name of *R. malvaceum.*)

R. setosum (bristly). *fl.* white, tubular, in pairs. May. *fr.*, berries black, spherical, hispid, with a pleasant, sub-acid, somewhat musky flavour. *l.* nearly round, cordate at base, pubescent, three to five-lobed. Branches densely bristly; prickles unequal, subulate. 1810. (B. R. 1237.)

R. speciosum (showy).* Fuchsia-flowered Gooseberry. *fl.* deep red, four-parted; calyx cylindrical; pedicels glandular-hairy; stamens twice as long as the calyx; peduncles longer than the leaves, one to three-flowered. *fr.* red. *l.* wedge-shaped at base, rounded at the outer end, indistinctly three-lobed, incisely crenate, glabrous and nerved; petioles short. Branches hispid. Prickles infra-axillary, triple. *h.*, in a wild state, 3ft. to 4ft.; twice as much in cultivation. California, 1829. (B. 38; B. M. 3530; B. R. 1557; S. B. F. G. ser. ii. 149.)

RIBESIEÆ. A tribe of *Saxifrageæ.*

RIB GRASS. The common name for *Plantago lanceolata.*

RICE. *See* **Oryza.**

RICE FLOWER. *See* **Pimelea.**

RICE PAPER PLANT, CHINESE. A common name for *Fatsia papyrifera.*

RICE PAPER PLANT, MALAY. *See* **Scævola Kœnigii.**

RICHARDIA (named in honour of L. C. Richard, 1754-1821, an eminent French botanist). SYN. *Zantedeschia* (in part). ORD. *Aroideæ* (*Araceæ*). A genus comprising five species of greenhouse or nearly hardy, marsh-loving, South African, perennial herbs, with thick rhizomes, four of which have been introduced to this country. Flowers monœcious, all perfect; spathe white or yellowish, erect; tube short, convolute, funnel-shaped, accrescent, persistent; throat opening; blade obliquely explanate, marcescent, with a cuspidate, recurved apex; spadix shorter than the spathe, sub-stipitate, erect, cylindrical; inflorescence dense-flowered; peduncles usually several, elongated. Leaves sagittate, sometimes with white, translucid, fenestrate dots; petioles elongated, thick, sheathed at base. Richardias are very distinct and attractive subjects, both on account of their handsome foliage and tall-growing, elegant flower spathes. They are easily cultivated, and the spathes, particularly those of the well-known *R. africana*, are greatly favoured for cutting purposes. In a greenhouse, few things are more attractive than a group of these plants in flower. Propagation is easily effected from suckers, which are produced in quantity. They may be taken at any time, when the old plants are being repotted; spring is, perhaps, the best season, as young suckers will then have time to

Richardia—*continued.*

establish themselves, so as to flower early the following season. Richardias require a very rich soil; a compost of good loam and cow-manure in nearly equal parts will suit them when established. The suckers should be inserted singly in pots proportionate to their size, and subjected to a little heat to start them. When under glass through the summer, they should be placed in a situation fully exposed to light, and about the end of July it is well to transfer them to the open air, in order to get the growth matured and well ripened—an essential towards free-flowering. Before the appearance of frost, the plants must be again housed; exposure to anything below freezing point proves very destructive to the foliage. An excellent plan of treating Richardias, when established, is that of planting them out each year in the open garden; a piece of ground should be prepared by adding a heavy dressing of manure, and the plants should then be turned out of their pots, and divided, or kept intact, according to their size and the quantity required. If planted about 15in. apart, but little attention will be necessary through summer, beyond supplying an abundance of water, which Richardias require at all times. About the middle of September, the plants may be lifted and potted carefully without much injury being caused. In this way, good, strong specimens may soon be obtained; they may be grown singly in 5in. or 6in. pots, or two or three together in a pot of larger size. Aphides are usually troublesome in spring, but an occasional fumigation will destroy them.

R. æthiopica (African). A synonym of *R. africana*.

FIG. 380. RICHARDIA AFRICANA.

R. africana (African).* Lily of the Nile; White Arum or Trumpet Lily. *fl.*, spathe usually dead-white, large, rolled round below, but flattened and bent backwards above; spadix bright yellow, completely covered with flowers. Spring and summer. *l.* sagittate, about half as broad as they are long, deep green, unspotted, cuspidate-apiculate at apex, borne on long petioles. *h.* 2ft. 1731. A very elegant and popular plant. See Fig. 380. SYNS. *R. æthiopica*, *Calla æthiopica* (B. M. 832).

R. albo-maculata (white-spotted).* *fl.*, spathe greenish-white, smaller and less expanded than in *R. africana*. Summer. *l.* elongate-hastate, borne on rather short petioles, cuspidate-apiculate at apex, marked with oblong, white, translucent blotches parallel with the nervation. *h.* 2ft. 1859. (B. M. 5140; F. d. S. 2258; I. H. 255; R. G. 462.)

R. hastata (halbert-leaved). *fl.*, spathe greenish-yellow, with a campanulate tube, and a long-cuspidate blade. Summer. *l.* subflaccid, hastate-ovate, about half as broad as they are long, cuspidate-apiculate at apex, unspotted, very similar to those of *R. africana*. *h.* 2ft. 1859. (B. M. 5176.)

R. melanoleuca (black and white).* *fl.*, spathe pale yellow, with a black-purple spot at the base, oblong, widely expanded, terminating the tall, hispid stems; spadix white, one-third shorter than the spathe; peduncle slender, dark bristly below. Summer. *l.* oblong or ovate, sagittate-hastate, marked with oblong, translucent, white spots. *h.* 1½ft. 1869. (B. M. 5765.)

RICHARDIA (of Linnæus). A synonym of **Richardsonia** (which *see*).

RICHARDSONIA (named in honour of Richard Richardson, an English botanist, who published a work on horticulture, in 1699). SYN. *Richardia* (of Linnæus). ORD. *Rubiaceæ*. A genus comprising five or six species of stove, erect or prostrate herbs, with perennial roots, natives of the warmer parts of America. Flowers white or pink, small, densely capitate. Leaves opposite, sessile, or shortly petiolate, ovate. *R. scabra* (Mexican Coca Plant) has been employed in medicine under the name of White Ipecacuanha, but its roots are smaller than those of the true plant, and less certain in their effects. Probably none of the species are now grown in this country.

RICHEA (named after Cl. A. Riche, a French naturalist, who died in 1791 when taking part in the Australian Expedition of Entrecasteaux). Including *Cystanthe*. ORD. *Epacrideæ*. A genus comprising eighteen species of greenhouse shrubs or small trees, inhabiting the mountains of Tasmania and South-eastern Australia. Flowers white or pink, in terminal spikes or panicles; calyx of five sepals, bracteate and bracteolate; corolla ovoid or conical, the lobes not separating; stamens hypogynous. Leaves sheathing at base, narrow, short or elongated, concave, sometimes grass-like, entire or serrulated. Branchlets marked with the scars of fallen leaves. The following are the only species introduced. For culture, *see* **Sprengelia.**

R. pandanifolia (Pandanus-leaved). *fl.* small, in ovate panicles, 2in. to 3in. long, on peduncles 4in. to 8in. long. Trunk naked, simple or sparingly branched, 6in. to 9in. in diameter, crowned by a large tuft of long, wavy leaves, like those of a Pandanus, often 3ft. to 5ft. long, tapering into a long point, and cartilaginously toothed. *h.* 20ft. to 36ft. 1884. Tree.

R. sprengelioides (Sprengelia-like). *fl.* reddish, in terminal, globular, leafy heads, each one nearly sessile within a floral leaf. June. *l.* broadly ovate-lanceolate, tapering to a short, rigid point, straight or slightly undulated or twisted, ¼in. to ½in. long, the floral ones gradually smaller. 1836. A bushy shrub, usually low, but sometimes attaining a height of several feet.

RICHEA (of Labillardière). A synonym of **Craspedia** (which *see*).

RICINUS (from *ricinus*, a tick; which insects the seeds are supposed to resemble). ORD. *Euphorbiaceæ*. A monotypic genus. The species is with us a well-known, tall, half-hardy, annual herb, but, in warmer regions, it grows as an arborescent shrub. Castor oil is yielded by the seeds of this plant, which, together with the capsules, are very variable. Any rich soil is suitable for the culture of *Ricinus*, and propagation may be readily effected by seeds, which should be sown and placed in heat early in March. It is best to sow single seeds in small pots, as the roots quickly become matted when there are many plants together, and cannot be separated without causing a severe check.

Ricinus—*continued.*

Young plants must be kept growing on under glass until early in June, when they may be hardened and put into their permanent positions outside. Varieties of *Ricinus* are most useful subjects for sub-tropical gardening, on account of their handsome foliage.

FIG. 381. RICINUS COMMUNIS.

R. communis (common).* Castor-oil Plant; Palma-Christi. *fl.* green, apetalous, rather large, disposed in sub-paniculate racemes at the apices of the branches; upper flowers male, clustered; lower ones female, shortly pedicellate. July. *fr.*, capsule smooth or prickly. *l.* alternate, ample, peltate, palmately seven or many-lobed; lobes serrated. *h.* 3ft. to 5ft. Probably of tropical African origin, but broadly dispersed, and naturalised throughout tropical regions, 1548. See Fig. 381. (B. M. 2209; S. F. G. 952; A. B. R. 420, under name of *R. armatus*.) There are several varieties of this species; the one grown under the name of *R. Gibsonii* having bronzy-purplish leaves.

RICOTIA (probably named after M. Ricot, an obscure botanist). ORD. *Cruciferæ*. A small genus (four species) of closely-allied, hardy, glabrous, branched herbs, natives of North Africa, Syria, and Asia Minor. Flowers pale lilac, in elongated, ebracteate racemes; sepals valvate, the lateral ones saccate at base; petals obcordate, unguiculate. Pods sessile, oblong, much compressed. Leaves almost bipinnatisect. *R. Lunaria*, the only species known in gardens, is a pretty annual, well adapted for ornamenting rockwork. A light, sandy soil suits it best. Seeds should be sown either on the rockwork or in the open border.

R. Lunaria (moon-podded). *fl.*, petals lilac, with white claws; pedicels filiform. June and July. Pods ovate-lanceolate. *l.* with oblong, sinuated, angular lobes. *h.* 9in. Syria, Egypt, 1757. (B. R. 49, under name of *R. ægyptiaca*.)

RICTUS. The mouth or gorge of a bilabiate corolla.

RIDERS. A name given to tall-stemmed fruit-trees that are used for covering the upper surface of high walls, either temporarily or permanently, while the lower part is furnished with dwarf trees.

RIDGES. In gardens, this term denotes the shape in which it is often desirable to arrange heaps of soil, manure, &c., for various cultural purposes. Ridge Cucumbers, for instance, are so designated because they succeed better on a heap of manure and soil formed in the shape which the name indicates, than on the level ground. Land dug or trenched in autumn is usually thrown unevenly into Ridges, to expose more of the surface to the action of frost than would be possible if it were made level. Soil, after being thus exposed all winter, may readily be broken and levelled down in spring, and, in this way, heavy land especially may be greatly improved, even in one season. Many other familiar instances might be cited, were it necessary, in favour of forming a Ridge in preference to another shape.

RIGIDELLA (a diminutive of *rigidus*, rigid; in allusion to the erect seed-bearing stalks). Stiff Stalk. ORD. *Irideæ*. Of this genus three species have been described; they are very ornamental, greenhouse plants, with truncated bulbs, natives of Mexico and Central America. Flowers several in a spathe, sometimes numerous, long-pedicellate; perianth cup-shaped at base, three-parted, spreading or reflexed, having no tube; stamens three; filaments connate into a cylindrical tube; spathes long, membranous, terminating the two or three long peduncles in the axils of the floral leaves. Capsule exserted. Radical leaves few, long, sometimes broad, plicate-veined, contracted into a long petiole; floral ones long-acuminate. For culture, *see* **Tigridia.**

R. flammea (flame-coloured). *fl.* bright flame-coloured, strongly marked at the base of the reflexed limb with deep purple stripes, drooping, in a dense umbel from within a two-valved spathe; tube campanulate. May. *l.* broad, equitant, strongly plaited, dilated at the base, where they sheath the stem. *h.* 3ft. to 5ft. Mexico, 1839. (B. R. 1840, 16; P. M. B. vii. 247.)

R. immaculata (unspotted). *fl.*, sepals scarlet, acute, 1⅝in. long, with a paler claw; petals yellow, cordate, acuminate. June. *h.* 2ft. Guatemala, 1839. This differs from *R. flammea* mainly in having smaller, unspotted flowers, and narrower leaves; the plant, also, is more slender. (B. R. 1841, 68; F. d. S. 502.)

R. orthantha (upright-flowered). *fl.* terminal, fasciculate, nodding; perianth deep vivid scarlet, with a triangular, black spot at the base of each segment, somewhat concave, divided at the base; anthers dark brown; stigmas deep pink. October. *l.* lanceolate, plaited, sheathing. *h.* 1½ft. Mexico, 1846. (P. M. B. xiv. 121.)

RIMA. A synonym of *Artocarpus*.

RIMOSE. Marked on the surface with chinks or cracks, like those of old bark.

RIND-GRAFTING. *See* **Grafting.**

RING-BUDDING. *See* **Budding.**

RINGED. Surrounded by elevated or depressed, circular bands or lines; *e.g.*, the roots or stems of some plants, the cups of several species of *Quercus*, &c.

RINGENT. Gaping; *e.g.*, the mouth of an open bilabiate corolla.

RINGING. A method of preparing layers for propagation. *See* under **Layering.**

RINGWORM ROOT. *See* **Rhinacanthus communis.**

RIOCREUXIA (named after A. Riocreux, a celebrated botanical artist). ORD. *Asclepiadeæ*. A small genus (four ? species) of slender, pubescent or glabrous, greenhouse, twining sub-shrubs, confined to South Africa. Calyx of five narrow segments; corolla with an elongated tube and linear lobes; corona sub-duplex, the exterior of five to ten scales, the interior of five smaller ones; cymes loose, umbelliform or dichotomous; peduncles simple or branched; pedicels filiform. Leaves opposite, cordate, membranous. *R. torulosa*, the only species introduced, thrives in sandy loam. Plenty of pot room and ample drainage must be afforded. Propagation may be effected by cuttings, taken preferably in spring, and inserted in sand, under a hand glass, with slight bottom heat.

R. torulosa (somewhat twisted). *fl.* pale yellow, flask-shaped, greenish at their ventricose base; umbels pedunculate, lateral or terminal, loose-flowered. Summer. *l.* deeply cordate-ovate. Roots tuberous. 1862. (Ref. B. 157.)

RIPIDIUM. A synonym of *Erianthus*.

RIPOGONUM. *See* **Rhipogonum.**

RITCHIEA (named in honour of Joseph Ritchie, a Yorkshireman, who was killed, in 1819, when exploring Central Africa). ORD. *Capparideæ*. A genus comprising only two or three species of erect or sarmentose, climbing, stove shrubs, natives of tropical Africa. Flowers greenish, large, sweet-smelling, corymbose, long-pedicellate; sepals four, ample, valvate; petals four or many, long-clawed, undulated, oblong, the blade imbricated; torus hemispherical, fleshy. Leaves simple, or three to five-foliolate; stipules obsolete. Only one species calls for mention here; it requires treatment similar to that recommended for **Euadenia** (which *see*).

R. fragrans (fragrant). *fl.* 4in. across; sepals ovate-oblong, deep green; petals about fourteen, pale straw-colour, strap-shaped, acuminate, crumpled above the middle; stamens very numerous, spreading. June. *l.* alternate; leaflets three to five, as long as, or longer than, the petioles, oblong or obovate-lanceolate, shortly petiolulate; petioles slender, 3in. to 5in. long. *h.* 3ft. 1859. An erect shrub. SYN. *R. polypetala* (B. M. 5344).

R. polypetala (many-petaled). A synonym of *R. fragrans*.

RIVEA (dedicated by Choisy to Auguste de la Rive, a physiologist of Geneva). ORD. *Convolvulaceæ*. A genus comprising only a couple of species of stove climbers or twiners, natives of the East Indies. Flowers large, on axillary, one to three-flowered peduncles; sepals ovate or oblong, obtuse; corolla salver-shaped, with a long, cylindrical tube, and an angulately sub-lobed limb; stamens included; filaments short; bracts narrow. Leaves broad beneath, and, as well as the inflorescence, often woolly or silky. The species described below require culture similar to **Ipomœa** (which *see*).

R. hypocrateriformis (salver-shaped). Midnapore Creeper. *fl.* pure white, large, expanding at sunset, and perfuming the air for a considerable distance with a fragrance resembling that of the finest cloves; corolla very wide; peduncles shorter than the petioles. July. *l.* cordate-roundish or altogether roundish, sometimes villous beneath. Western India, &c., 1799. Don says this species is the prince of convolvulaceous plants.

R. ornata (adorned). *fl.*, corolla white, silky without; peduncles mostly three-flowered. June. *l.* orbicularly cordate or reniform, large, clothed with cinereous tomentum beneath. Stem white; branches silky. 1824.

RIVINA (named in honour of A. Q. Rivinus, a native of Saxony, 1652-1722, for some time Professor of Botany and Medicine at Leipsic). Hoop Withy. SYN. *Piercea*. ORD. *Phytolaccaceæ*. A genus comprising, according to Bentham and Hooker, one or two species of stove, erect, dichotomously-branched herbs, shrubby at base, natives of tropical and sub-tropical America. Flowers hermaphrodite, racemose; perianth corolla-like, four-parted; segments obovate-oblong, obtuse, concave, coloured, unchanged and erect or spreading during fructescence; stamens four. Fruit red, pisiform. Leaves alternate, slender-stalked, ovate, ovate-lanceolate, or cordate-ovate, acute, obtuse, or long-acuminate, obscurely

Rivina—*continued.*

crenate, membranous. Rivinas may readily be propagated by seeds or cuttings, which, after being inserted during spring, should be placed in heat. The plants grow freely afterwards in any rich, loamy soil. When covered with berries in winter time, they are exceedingly attractive.

R. humilis (low).* Bloodberry; Rouge Plant. *fl.* whitish-rose, scarcely one line long, sub-reflexed; racemes longer than the leaves. January to October. *fr.*, berries bright scarlet, disposed in racemes. *l.* (including the petiole) 1in. to 2in. long, ovate, acuminate, sub-entire, rather thick, slightly tomentose or densely pubescent. Stem shrubby; branches, petioles, and racemes slightly pubescent. *h.* 1ft. to 2ft. Caribbee Islands, &c., 1699. (B. M. 1781.)

R. lævis (smooth).* *fl.* whitish-rose, small; racemes 1in. to 2in. long. February to September. *fr.*, berries red. *l.* 2½in. to 4in. long, sub-cordate-ovate, acuminate, slightly crenulated, slender, scarcely undulated, highly glabrous. Stem shrubby; branches glabrous. *h.* 7ft. to 8ft. West Indies, 1733. (B. M. 2333.)

R. l. pubescens (downy). A form with white flowers and pubescent leaves and branches. 1699.

RIZOA. A synonym of **Gardoquia** (which *see*).

ROADS. Road-making, under a proper system, is rather an expensive undertaking, particularly when the requisite material is difficult to procure. It is, however, of great importance that an approach Road or carriage drive, leading to a mansion, should be properly lined out, and formed, and be afterwards kept clean and in good repair. The bed should be well drained, and the bottom filled, to a depth of about 1ft., with hard, porous material, such as rough stones; on this should be placed about 3in. of rather finer material, such as broken granite or ballast, and a similar depth of finer gravel still put over the surface. In the formation of Roads, the proper levels must first be ascertained, and the full depth taken out altogether, should the ground be of an unsuitable description. The several depths of the different sorts of material may be best indicated by pegs driven in some 10ft. apart, so that their tops may be used as a guide for working.

ROAN OR ROWAN-TREE. A common name for *Pyrus Aucuparia*.

ROAST-BEEF PLANT. A common name for *Iris fœtidissima*.

ROBERGIA (of Schreber). A synonym of **Rourea** (which *see*).

ROBERGIA FRUTESCENS. A synonym of **Connarus pubescens** (which *see*).

ROBERTSIA. A synonym of **Sideroxylon** (which *see*).

ROBERTSONIA. Included under **Saxifraga** (which *see*).

ROBINIA (named in honour of John Robin, herbalist to Henri IV. of France, and his son, Vespasian Robin, who first cultivated the Locust-tree in Europe). Locust-tree. ORD. *Leguminosæ*. A genus comprising five or six species of mostly hardy, sub-glabrous, clammy, or bristly trees or shrubs, natives of North America and Mexico. Flowers white or rose-purple, in axillary racemes; calyx teeth short and broad, the two upper ones sub-connate; standard ample, reflexed, naked within; wings falcate-oblong, free; keel incurved, obtuse; bracts membranous, very caducous. Leaves impari-pinnate; leaflets entire, reticulate-penniveined; stipules bristly or spiny. The species described below are all hardy and deciduous, and are very handsome subjects for the ornamentation of the shrubbery. Any common soil will suit them, provided it be not too wet. Propagation may be best effected by layering; the rarer kinds, however, are usually increased by grafting on the commoner sorts, especially *R. Pseudacacia*.

R. dubia (doubtful). *fl.* pale rose-coloured, sweet-scented; racemes loose and pendulous. June to August. Pods brown,

Robinia—*continued.*

thickly beset with short prickles. *l.*, leaflets ovate. *h.* 25ft. Hybrid tree.

R. hispida (hispid).* *fl.* deep rose-colour, large, inodorous, in loose and usually pendulous racemes. May and June. Pods glandular-hispid. *l.*, leaflets eleven to eighteen, smooth, ovate or oblong-ovate, rounded or slightly cordate at base, tipped with a long bristle. Branches and stalks more or less bristly. *h.* 3ft. to 8ft. North America, 1743. Shrub or small tree. See Fig. 382. (B. M. 311.)

FIG. 382. FLOWERING BRANCH OF ROBINIA HISPIDA.

R. h. macrophylla (large-leaved). *l.*, leaflets large, ovate-roundish. Branches and peduncles glabrous, without prickles. *h.* 10ft. An ornamental variety.

R. jubata (bearded). A synonym of *Caragana jubata.*

R. Pseudacacia.* Bastard Acacia; False Acacia; Common Locust. *fl.* white, fragrant, in slender, loose, pendulous racemes, 3in. to 5in. long; calyx spotted. April and May. Pods smooth. *l.*, leaflets nine to seventeen, oblong-ovate or elliptical. Branches naked. *h.* 30ft. to 60ft. North America, 1640. A tree, with hard and durable wood. There are many varieties of this species in English gardens.

R. P. Bessoniana (Besson's).* Branches thornless. This variety forms a compact, round-headed tree.

R. P. crispa (curled). *l.*, leaflets all, or for the most part, undulately curled. *h.* 40ft.

R. P. Decaisneana (Decaisne's). *fl.* bright rosy-pink. (R. H. 1863, p. 151.)

R. P. fastigiata (pyramidal). A form with a habit similar to that of the Lombardy Poplar.

R. P. inermis (unarmed). A small-growing, round-headed bush. It is usually grafted on tall stems of the common type.

R. P. monophylla (one-leaved). *l.* reduced to a single leaflet.

R. P. semperflorens (ever-flowering). This variety continues flowering throughout the summer. (R. H. 1875, 191.)

R. P. sophoræfolia (Sophora-leaved). *l.* large, somewhat resembling those of *Sophora japonica.* *h.* 25ft.

R. P. stricta (upright). This has the general tendency to grow upright, but the plant is not as fastigiate as the Lombardy Poplar. *h.* 30ft.

R. P. tortuosa (twisted). *fl.*, racemes similar to those of the type, but smaller and fewer-flowered. Branches curiously twisted. *h.* 40ft.

R. P. umbraculifera (umbrella-bearing). *l.*, leaflets ovate. Branches much crowded, smooth. Head orbicular. *h.* 40ft.

Other forms of *R. Pseudacacia* are: *macrophylla*, leaves long, and leaflets broad; *microphylla*, leaves small, and leaflets narrow; *monstrosa*, leaves large and twisted; *pendula*, shoots slightly drooping; *procera*, tall, and vigorous-growing; *spectabilis*, leaves large, shoots straight and vigorous.

R. viscosa (clammy).* *fl.* rose-colour, crowded into roundish, erect racemes, nearly inodorous. May and June. Pods glandular-viscid. *l.*, leaflets eleven to fifteen, ovate and oblong, obtuse or slightly cordate at the base, paler and pubescent beneath, tipped with a short bristle. Branches, petioles, &c., glandular-viscid. *h.* 20ft. to 40ft. North America, 1797. Tree. (B. M. 560, under name of *R. glutinosa.*) *R. bella-rosea* is either a form of this species, without the characteristic viscidity, or a hybrid between it and *R. Pseudacacia.*

ROBIN'S PINCUSHION. A common name for the Rose Bedeguar.

ROBIQUETIA. A synonym of **Saccolabium** (which *see.*)

ROCAMBOLE (*Allium Scorodoprasum*). A hardy perennial, cultivated for the use of its bulbs in a somewhat similar way to those of Garlic. Increase is effected by dividing the bulbs which form, annually, at the root, and also on the tops of the stems. When separated singly, these should be planted, at the end of February or in March, 8in. apart and about 2in. deep. So soon as the leaves decay, lift and dry the bulbs in the sun; they will then be ready for storing for future use.

ROCHEA (named in honour of M. de la Roche, a French botanist). SYN. *Kalosanthes.* ORD. *Crassulaceæ.* A small genus (about four species) of small, greenhouse, shrubby succulents, confined to South Africa. Flowers white, yellow, pink, or scarlet, rather large, aggregated in corymbose-capitate cymes; calyx five-parted or five-fid; corolla salver-shaped, its tube longer than the calyx, the limb five-parted, spreading; stamens five, included. Leaves opposite, connate at base, oblong, obovate, or lanceolate. For culture, *see* **Crassula.**

R. coccinea (scarlet). This is the correct name of the plant described in this work as *Crassula coccinea.*

R. jasminea (Jasmine-like). This is the correct name of the plant described in this work as *Crassula jasminea.*

R. odoratissima (very fragrant). *fl.* pale yellow or creamy-white, sometimes rosy, sweet-scented, about 1in. long; limb of the petals lanceolate; cymes many-flowered. June. *l.* erecto-patent, linear-lanceolate or subulate, 1in. to 1½in. long, taper-pointed. Stem erect, 1ft. to 1½ft. high, scabrous, much-branched or nearly simple. 1793. SYN. *Crassula odoratissima* (A. B. R. 26).

R. versicolor (various-coloured). This is the correct name of the plant described in this work as *Crassula versicolor.*

ROCHELIA. A synonym of **Echinospermum** (which *see*).

ROCK BEAUTY. A common name for *Draba pyrenaica.*

ROCK BRAKE. *See* **Cryptogramme.**

ROCK CRESS. *See* **Arabis.**

ROCK CRESS, PURPLE. A common name for *Aubrietia deltoidea purpurea.*

ROCKERIES. Where alpines and perennials are cultivated in any great quantity, it is essential that some sort of a Rockery should be provided for the accommodation of the rarer and dwarf-growing species. It may be on a small or an unlimited scale, according to the extent of the collection; in any case, this style of gardening affords very great interest, especially when the plants can be induced to succeed. Besides alpines and dwarf perennials, there are numerous other subjects that may often be appropriately introduced, such as hardy Ferns, Yuccas, compact-growing shrubs, Junipers, hardy Heaths, &c. When constructing a Rockery, the principal object should be to provide situations, and allow sufficient space amongst the stones for the plants to grow. The outline or shape can be formed by building up such ordinary soil as may be at command; the stones can then be embedded over any part of the surface desired, and a new compost added at the time the plants are arranged and inserted. Rockwork is generally constructed of stone, if this is procurable; but frequently other substitutes, such as old bricks, clinkers, &c., have to be utilised. Little can be said respecting the proper arrangement, as this varies, in almost every individual case, to suit the situation, plants available, and the surroundings. A background of some sort is desirable, for affording shelter and protection from cutting winds;

Rockeries—*continued.*

Rhododendrons are well suited for the purpose, as they grow tall if allowed, and their roots never spread far enough to rob the rock plants, as would those of large trees. To meet the requirements of the numerous subjects available for planting on a Rockery, it is requisite to provide various aspects and different kinds of soil; and, in planting, a knowledge of the habit each plant assumes is necessary, in order to dispose of all to the best advantage for producing a future effect. A general fault is to allow too little rooting space, by making the pockets—as the divisions between the stones are generally called—too small. This should specially be avoided; if roots cannot get down and establish themselves, the plants soon become dried up in hot weather, particularly on sunny exposures. The class of plants which thrive best on rockwork—indeed, there are many that could scarcely be grown except in such a situation—is a very extensive one, and includes a large proportion of beautiful and most interesting subjects. If dwarf shrubs and other plants, also hardy bulbs, are introduced, the variety that may be represented in the limited space which a Rockery usually affords is really surprising. A very large proportion of the genera *Saxifraga* and *Sedum* make excellent rockwork plants. Other remarks on this subject may be found under *Rock Garden* in the article **Garden.**

ROCKET. *See* **Hesperis matronalis.**

ROCKET CANDYTUFT. *See* **Iberis coronaria.**

ROCKET, DAME'S OR WHITE. *See* **Hesperis matronalis.**

ROCKET, DYERS'. A common name for *Reseda Luteola.*

ROCKET, SEA. *See* **Cakile.**

ROCKFOIL. A name, suggested by Ruskin, for the genus *Saxifraga.*

ROCK PINK. *See* **Dianthus petræus.**

ROCK ROSE. *See* **Cistus.**

RODGERSIA (named in honour of Admiral Rodgers, of the United States Navy, commander of the expedition during which the plant was first discovered). ORD. *Saxifrageæ.* A monotypic genus. The species is a hardy, erect, herbaceous perennial, with a thick, scaly rhizome. It thrives best in a compost of rich loam and peat, and may be increased by divisions.

R. japonica (Japanese). A synonym of *R. podophylla.*

R. podophylla (stalked-leaved). Rodgers' Bronze-Leaf. *fl.* of a yellowish-white colour, somewhat nodding, ebracteate; calyx tube very short, turbinate; lobes five, spreading, valvate; petals wanting; stamens ten; filaments elongated; cymes scorpioid, disposed in ample, naked panicles. June and July. *l.* three to five, large, alternate; radical ones larger, long-stalked, palmately or peltately five-sected; cauline ones three-lobed; segments sessile, argutely serrated, incised at apex; petioles dilated at base; stipules membranous, adnate to the petioles. *h.* 3ft. to 4ft. Japan, 1880. (B. M. 6691; G. C. n. s., xx. 141.) SYN. *R. japonica* (R. G. 708).

RODRIGUEZIA (named in honour of Em. Rodriguez, a Spanish physician and botanist). *Burlingtonia* is now regarded, by the authors of the "Genera Plantarum," as synonymous with this genus, but is kept distinct in this work. ORD. *Orchideæ.* A genus comprising about a score of species of interesting, stove, epiphytal orchids, natives of tropical America. Flowers usually showy, many in a simple raceme; dorsal sepal free, petaloid, the lateral ones narrow, connate; petals similar to the dorsal sepal; lip continuous, or very shortly connate with the base of the column, the base often produced into a spur, the lamina spreading, obovate or obcordate, often exceeding the sepals, the disk usually crested; column erect, slender, club-shaped or produced into two auricles at the apex; pollen masses two; scapes axillary under the pseudo-bulbs. Leaves oblong or elongated, coriaceous. For culture of the species described below, *see* **Burlingtonia.**

Rodriguezia—*continued.*

R. Batemani (Bateman's). This is the correct name of the plant described in this work as *Burlingtonia Batemani.*

R. caloplectron (beautiful-spurred). *fl.* light yellowish-white, twisted; lateral sepals forming a long, compressed, horn-like, acute body, wrapping round the spur of the emarginate lip; column square-winged; inflorescence usually pendulous, few-flowered. *l.* solitary, thick, lanceolate, acuminate. Pseudo-bulbs small, oblong-ligulate. New Grenada, 1871.

R. lanceolata (lanceolate). A synonym of *R. secunda.*

R. Leeana (Lee's). *fl.* the size of those of *Burlingtonia candida*; ovary light mauve; upper sepal white, yellowish on mid-line; lateral ones white with yellow mid-line, quite connate; petals ligulate; lip clawed, white, with two long-linear, yellow keels, every keel having four small, lateral keels spreading outwards; column white, with numerous mauve spots. *l.* linear-ligulate, acute, 1ft. long. Pseudo-bulbs ancipitous. Native country uncertain, 1883. A curious and very stout species.

R. Lehmanni (Lehmann's). *fl.* whitish-ochre, with a brown wash; odd sepal gibbous-fornicate in the middle; lateral ones combined in a narrow, falcate, spur-like organ, with a broad, membranous lamina before the apex; petals cuneate-obovate, emarginate; lip having a solid, acute spur between the lateral sepals, the free part clawed, suddenly enlarged in a blade, blotched and spotted with cinnamon. New Grenada and Ecuador, 1882. (G. C. xix. 403.)

R. refracta (bent back). *fl.* of a peculiar yellow-salmon colour, few, in a porrect raceme; dorsal sepal cuneate-obovate, bluntly acute, the lateral ones combined into one navicular, narrow body; petals cuneate-obovate; lip clawed, expanding into an emarginate blade, having on both sides four or five angular keels. *l.* of pseudo-bulb cuneate-oblong, acute. Peru. (Ref. B. 129.)

R. secunda (side-flowering). *fl.* dark rose-colour, disposed in a cylindrical, recurved spike, which is longer than the leaves; sepals fornicate; petals ovate, obtuse; lip abruptly deflexed. *l.* lanceolate, obliquely emarginate at the apex. Pseudo-bulbs oval, compressed. *h.* 6in. Trinidad, 1820. (B. M. 3524; B. R. 930.) SYNS. *R. lanceolata* (L. B. C. 676), *Pleurothallis coccinea* (H. E. F. 129).

RODS, BONING OR BORNING. These are invaluable instruments in levelling ground, or for determining heights in making an incline uniform throughout. They are always requisite when laying out new walks or edges, levelling turf, &c. There are usually three made, straight, and of equal length, about 3½ft. or 4ft., and provided with cross-pieces, which should be fixed in the centre, and at exact right angles. Before Borning Rods can be brought into use, it is necessary that two points should be fixed, preferably at the extreme ends of the ground to be levelled, should these not be too far apart. If level pegs are inserted at these points, and two of the three Rods allowed to rest on them, as many intermediate pegs may be inserted as thought desirable for guiding workmen. This is done by a third person with the other Rod, who drives pegs in as he is directed from one of the ends, until all the Rods are in, as near as possible, a direct line. The tops of the pegs, if the levelling is properly done, should then show all inequalities in the soil, and represent themselves either a level surface or a uniform incline, according to the disposition of the ground and the comparative heights of the two fixed points taken at the commencement. Boning or Borning Rods of equal length can only be used correctly by persons accustomed to them, as the light is found most deceiving at a distance. Sometimes, one of the Rods is made an inch longer, and a small sight-hole pierced through the cross-piece. By using this, it is possible to work with more exactness, as a workman who might be able to level through a sight-hole might not be able to do so correctly were all the Rods made of equal length, and no sight-hole pierced.

RODS, MEASURING. For regulating the distance between rows and beds, and for marking out spaces for walks between trees, &c., Measuring Rods of some description are indispensable. Either 10ft. or 12ft. is a handy length; the first foot length should be marked in inches, and all the others at intervals of 3in. Straight Rods 1¼in. square are suitable.

ROEBUCK BERRY. The fruit of *Rubus saxatilis.*

ROELLA (named in honour of William Roell, Professor of Anatomy at Amsterdam). ORD. *Campanulaceæ*. A genus comprising eleven species of greenhouse, rigid sub-shrubs or small, diffuse herbs, confined to South Africa. Flowers sessile within the imbricating leaves, solitary or glomerate; calyx with an adnate, oblong or cylindrical tube and a five-parted limb, the lobes often toothed; corolla campanulate or funnel-shaped, five-lobed. Leaves scattered, small or narrow, often rather rigid and fascicled at the axils, entire or ciliate-toothed. Several of the species have been introduced, but that described below is the most desirable. A compost of sandy loam and peat is most suitable for its culture. Propagation may be effected by seeds; or by young cuttings, which will root freely in the soil above-named, if a hand glass be placed over them.

R. ciliata (ciliated-leaved). African Harebell. *fl.* solitary, terminal; corolla white at base, with a deep purple circle, above pale violet, girded by white, the lobes rose-coloured. September. *l.* erect, linear, acuminated, ciliated; upper ones longer. *h.* 6in. to 12in. 1774. (B. M. 378; F. d. S. 517; L. B. C. 1156.)

RŒMERIA (named in honour of John James Rœmer, 1763-1819, Professor of Botany at Landshut, and author of several botanical works). SYN. *Romeria*. ORD. *Papaveraceæ*. A genus comprising only two species (and these, perhaps, varieties of one) of very pretty, hardy, annual herbs. Seeds should be sown in the open border, in spring, where the plants are to remain.

R. hybrida (hybrid). Violet-flowered Horned Poppy; Wind Rose. *fl.* violet-purple with a black disk; sepals hairy. May and June. Capsules 2in. to 3in. long, cylindric, hispid above. *l.* once or twice pinnatifid; segments tipped by a bristle. Stem erect. *h.* 2ft. South and West Europe, &c. (Britain). This plant has the habit of *Papaver Argemone*. (Sy. En. B. 64.) SYN. *R. refracta*.

R. refracta (bent back). A synonym of *R. hybrida*.

RŒMERIA (of Trattinick). A synonym of **Steriphoma** (which *see*).

RŒPERA. Included under **Zygophyllum** (which *see*).

ROEZLIA (named in honour of Roezl, a well-known collector, who travelled in Mexico, Central America, &c.). ORD. *Melastomaceæ*. A monotypic genus. The species is an erect, stove shrub, requiring culture similar to **Monochætum** (which *see*).

R. granadensis (New Granada).* *fl.* carmine-purple; calyx red, four-lobed; petals four, roundish-ovate, emarginate; stamens four; panicles terminal, many-flowered; peduncles glabrous or nearly so. Autumn. *l.* opposite, petiolate, ovate-lanceolate, hairy on both sides, entire, five to seven-nerved. Branches subangular. *h.* about 3ft. New Granada. (R. G. 706.)

R. regia (royal). A synonym of *Furcræa Bedinghausii*.

ROGATION FLOWER. *See* **Polygala vulgaris**.

ROGIERA. Included under **Rondeletia** (which *see*).

ROHDEA (named in honour of Mich. Rohde, physician and botanist, of Bremen). SYN. *Titragyne*. ORD. *Liliaceæ*. A monotypic genus. The species is a greenhouse or half-hardy, perennial, with a short, thick rhizome. For culture, *see* **Reineckea**.

R. japonica (Japanese). *fl.*, perianth white, fleshy, ⅛in. long and thick; spike very dense, 1in. to 2in. long. January to April. *l.* all radical, nine to twelve in a rosette, sub-erect, sessile, oblanceolate, 1ft. long, 2in. to 3in. broad, glabrous, acute. *h.* 2ft. Japan, 1783. (B. M. 898, under name of *Orontium japonicum*.)

ROHRIA. A synonym of *Berkheya*.

ROLANDRA (named in honour of Daniel Rolander, a pupil of Linnæus, who visited Surinam). ORD. *Compositæ*. A monotypic genus. The species is a greenhouse, evergreen shrub, with inconspicuous, white flower-heads and penniveined leaves, native of tropical America. It is probably lost to cultivation.

ROLLERS AND ROLLING. For keeping walks firm and in good condition, an iron Roller is requisite in gardens. The size must be determined by the extent and width of the walks to be Rolled. New gravel walks should always have a light Roller passed over them

Rollers and Rolling—*continued*.

first, and a heavy one afterwards. Others, if they are firm, and have been well made in the first place, should bear a heavy weight always. Rollers of almost any size may be obtained in iron up to several hundredweights. Rolling should only be practised when walks are sufficiently dry to keep the gravel from clinging; the proper time frequently does not last long, and, when walks are rough, an opportunity for Rolling them should not be lost.

ROMANA. A synonym of *Buddleia*.

ROMANZOFFIA (named in honour of Count Romanzov, a Russian nobleman, who was a patron of scientific studies). ORD. *Hydrophyllaceæ*. A genus consisting of only two species of low, tufted, hardy perennial herbs, having much the appearance of Saxifrages; they inhabit the sub-arctic regions of Eastern Asia and Western America. Flowers white, unilaterally racemose; calyx segments five; corolla broadly or tubularly campanulate with five imbricated, spreading lobes; stamens five, affixed to the base of the corolla. Radical leaves long-stalked, cauline ones very few, orbicular-reniform, deeply toothed. *R. sitchensis*, the only species introduced, is a suitable subject for planting on rockwork. It requires much the same culture as **Saxifraga** (which *see*).

R. sitchensis (Sitcha).* Sitka Water Leaf. *fl.* white; corolla nearly thrice the length of the calyx; peduncles straight. April. *l.* long-stalked, somewhat rounded-reniform in shape. *h.* 4in. Sitcha, 1873. (B. M. 6109; R. G. 748.)

ROMERIA. A synonym of **Rœmeria** (which *see*).

ROMNEYA (named after the Rev. Dr. T. Romney Robinson, an astronomer, of Armagh). ORD. *Papaveraceæ*. A monotypic genus. The species is a tall, showy, branched, glabrous, herbaceous perennial, allied to *Platystigma*. Although a half-hardy plant, it nevertheless thrives best, and produces larger and more abundant flowers if allowed space in a cool greenhouse. A rich, sandy loam soil is most suitable. The species may be increased by means of seeds, sown in the spring.

R. Coulteri (Coulter's).* *fl.* white, showy, terminating the branches, corymbose or solitary; sepals three, scarcely 1in. long; petals six, biseriate, 2½in. long, broadly obovate, thickened at the base; stamens very numerous, many-seriate. Summer. *l.* petiolate, glabrous, glaucous, pinnatifid, setose-ciliated on the margins; lower segments linear-lanceolate, upper ones deltoid; petioles one-fourth the length of the leaves. *h.* 2ft. to 4ft. California, 1875. (F. M. 252; G. C. n. s., iii. 280; Gn. xi. 374; R. G. 1876, 152.)

ROMULEA (a name commemorative of Romulus, the mythical founder of Rome). SYN. *Trichonema*. Including *Spatalanthus*. ORD. *Irideæ*. A genus of pretty, greenhouse or hardy, bulbous plants, natives of Western Europe, the Mediterranean region, and South and West Africa. Fifty-four species have been enumerated, but, according to the authors of the "Genera Plantarum," many of these are reducible to mere varieties. Mr. Baker, in his review of the genus published in the "Journal of the Linnean Society," xvi. 86, accords specific rank to thirty-six. Flowers one to a spathe, sub-sessile or shortly pedicellate; perianth funnel-shaped, with a very short, or rarely elongated, tube, and equal, erecto-patent, entire lobes; stamens affixed to the throat; spathes long-pedunculate in the axils of the floral leaves; bracts beneath the ovary at the apex of the pedicel shorter, and sometimes broader, than the spathe. Radical leaves linear, sometimes subulate, the sheaths rarely lanceolate-dilated; cauline leaves similar, but smaller. The species described below are those best known to cultivation. They require to be planted out in a pit or frame, in a compost of sandy loam and peat. Propagation may be effected by offsets.

R. bulbocodioides (Bulbocodium-like). *fl.* greenish-yellow; outer spathe valve navicular-convolute, inner one very slender and dark-striped; scape terete, two-sheathed. June. *l.*, radical ones fistular-sheathing; cauline ones binate, in threes, or rarely solitary, alternating with the peduncles. *h.* 6in. Cape of Good Hope, 1810. Greenhouse. (B. M. 1392, under name of *Trichonema caulescens*.)

Romulea—*continued.*

R. Bulbocodium (Bulbocodium).* *fl.* yellow below, violet above the middle, large; spathe two-valved, the outer valve ovate, carinate, the inner one broad and purple-spotted; scape simple, rarely bifid, densely leafy. March. *l.* linear-ensiform, furcate, channelled and sheathing at base, arcuately recurved. *h.* 6in. South Europe, 1739. Hardy. (Fl. Ment. 93A; B. M. 265, under name of *Ixia Bulbocodium.*) A variety, *P. Pylium*, has white flowers marked with purple, borne on a many-flowered scape. (B. R. xxx. 40, Fig. 2, under name of *Trichonema Pylium.*) *P. subpalustre* is a form having white flowers margined with blue. (B. R. xxx. 40, Fig. 1, under name of *Trichonema palustre.*)

R. Columnæ (Columna's). *fl.* greenish outside, whitish within, with purple veins and a yellow base, one to three on a very short scape; spathe longer than the perianth tube. March to May. *l.* wiry, 2in. to 4in. long, recurved, sub-cylindric, grooved above. South and West Europe (Britain), &c. (Fl. Ment. 91.) SYN. *Trichonema Columnæ* (Sy. En. B. 1492).

R. cruciata (cruciate). *fl.* rose-coloured, terminal, erect; outer spathe valve striated and purple-spotted, inner one dark-striped and dotted; scape simple or branched. May. *l.* long-sheathing at base, four-ribbed on both sides, undulately recurved. *h.* 6in. Cape of Good Hope, 1758. Half-hardy. (B. M. 575, under name of *Trichonema cruciatum.*)

R. pudica (chaste). *fl.* pink, with violet spots at the base, terminal, pedunculate; spathe valves striate, keeled, equal; scape terete, short, simple, curved. August. *l.* lanceolate-linear, tricostate-bisulcate; upper ones ventricose-sheathing. *h.* 6in. Cape of Good Hope, 1808. Greenhouse. (B. M. 1244, under name of *Trichonema pudicum.*)

R. ramiflora (branch-flowered). *fl.* yellow in the throat, rather small; outer segments yellowish outside, and deep or pale lilac in the upper part; inner segments purple in the upper part inside and out; scape elongated, two or three-flowered. May. *l.* 6in. to 12in. in length, stout, straight or recurved. Naples, 1830. Hardy. (Fl. Ment. 92; S. B. F. G. 596, under name of *Trichonema ramiflora.*)

R. rosea (rosy). *fl.* rose-coloured, yellow at base, terminal, stalked, campanulate; spathe valves broadly ovate, acute, striated, purple-spotted; scape terete, simple, leafy. July. *l.* recurved, long-sheathing at base, often slenderly ciliated on the ribs. *h.* 6in. Cape of Good Hope, 1818. Greenhouse. (B. M. 1225, under name of *Trichonema roseum.*)

R. speciosa (showy).* *fl.* rose-coloured, yellow and violet-striped at the base of the segments; outer spathe valve convolute and striate, inner one ventricose, obtuse, and broader; scape terete, simple, erect, leafy. May. *l.* slender, somewhat Rush-like, four-channelled, long-sheathing, slightly twisted. *h.* 6in. Cape of Good Hope, 1808. Greenhouse. (A. B. R. 170, under name of *Bulbocodium speciosum*; B. M. 1476, under name of *Trichonema speciosum*; S. B. F. G. 300, under name of *Spatalanthus speciosus.*)

RONDELETIA (named in memory of William Rondelet, 1507-1566, a scientific physician, whose attention was chiefly devoted to fishes and algæ). SYNS. *Arachnimorpha*, *Lightfootia* (of Schreber), and *Willdenovia*. Including *Rogiera*. ORD. *Rubiaceæ*. A genus comprising about sixty species of stove evergreen shrubs and (rarely) trees, with terete branchlets, natives of the West Indies and tropical America, but very rare in Guiana and Peru. Flowers white, yellow, or red, small, pedicellate, disposed in corymbose or paniculate, axillary or rarely terminal cymes; calyx four or five-lobed, persistent; corolla funnel or salver-shaped, the limb of four or five spreading lobes; stamens four or five. Leaves opposite, rarely ternately whorled, sessile or petiolate, coriaceous or membranous; stipules broad, interpetiolar, deciduous or persistent. Many of the species are very pretty, and well deserving of a position in the stove. The most suitable soil is a compost of loam, peat, and sand. Propagation may be readily effected by cuttings, inserted in sand, under a bell glass, in heat. A selection of the best-known species is given below.

R. americana (American). *fl.* white, slightly odorous; cymes axillary, corymbiform, long-pedunculate, pubescent. August. *l.* lanceolate-oblong, 2in. long, pointed, acuminate at base, glabrous, hispidulous on the nerves within; stipules hairy within. *h.* 5ft. West Indies, 1752.

R. amœna (pleasing).* *fl.* of a beautiful pink colour, golden-bearded at the throat, clustered; lobes of corolla emarginate. June. *l.* broadly oblong, 2in. to 5in. long, acuminate, nerved. *h.* 4ft. Guatemala. SYNS. *R. versicolor* (B. M. 4579), *Rogiera amœna* (F. d. S. 442; L. & P. F. G. i. 143).

R. Backhousii (Backhouse's). *fl.* rose-coloured, pedicellate, ½in. to ¾in. long, in terminal, erect, loosely many-flowered panicles; corolla tube pubescent, twice or thrice as long as the calyx lobes. Autumn. *l.* opposite, shortly petioled, 4in. to 9in. long, sub-

Rondeletia—*continued.*

acute, membranous; petioles and veins beneath red. 1860. A small shrub, of unknown origin; it is probably identical with *R. erythronema*, of Karsten. (B. M. 6290.)

R. cordata (heart-shaped).* *fl.* pink, four-parted; cymes terminal, corymbose, many-flowered. Summer. *l.* sub-sessile, ovate or ovate-lanceolate, acuminate, cordate at base, coriaceous, puberulous beneath and on veins, or at length glabrous; stipules ovate-lanceolate, leafy, reflexed. *h.* 4ft. Guatemala, 1844. SYN. *Rogiera cordata* (F. d. S. 754).

R. gratissima (most agreeable).* *fl.* pinkish, sweet-scented, with a long tube and five lobes, disposed in dense, terminal, corymbiform cymes, and not unlike those of the Laurestine. *l.* lanceolate-elliptic. Mexico, 1866. A beautiful, cool stove shrub. (I. H. n. s. 424; F. d. S. 1570-1 and R. G. 490, under name of *Rogiera gratissima.*)

R. hirsuta (hairy). *fl.* yellow; corolla tube externally hairy; cymes axillary, corymbiform, shaggy-pilose, on peduncles as long as the leaves. July. *l.* elliptic or elliptic-oblong, 2in. to 5in. long, cuspidate, rounded or blunt at the base, hispidulous on both sides with scattered down; stipules shaggy-pilose. *h.* 4ft. Jamaica, 1820.

R. laurifolia (Laurel-leaved). *fl.* brownish-yellow, fragrant; corolla sub-rotate; cymes in axillary, hoary-pubescent, racemiform panicles. July. *l.* elliptic-oblong, 3in. to 5in. long, pointed, glabrous; stipules subulate-deltoid, villous within. *h.* 4ft. Jamaica, 1824.

R. odorata (odorous).* *fl.* bright vermilion, fragrant, in terminal, trichotomously compound corymbs; pedicels hairy; corolla salver-shaped, with a narrow tube and a spreading limb. November. *l.* in opposite and rather remote pairs, ovate, acute or somewhat acuminate, entire, waved, on very short petioles. Stem straggling, with rounded, downy branches. *h.* 3ft. Cuba (said also to be Mexican), 1836. (B. 53; B. M. 3953; B. R. 1905.) SYN. *R. speciosa* (L. B. C. 1893; P. M. B. ii. 242, v. 354).

R. o. breviflora (shorter-flowered). *fl.* vermilion or bright orange-red, with a distinct yellow eye; corolla shorter than in the type; limb nearly ½in. in diameter. West Indies. (B. M. 6350.)

R. Purdiei (Purdie's).* *fl.* pale yellow, fragrant, ½in. in diameter, crowded into terminal and axillary, rounded corymbs; corolla with a thickened ring at the throat. Summer. *l.* 3in. to 8in. long, ovate-oblong or almost oblong-lanceolate, but obtuse, narrowed at base into the very short petiole, or suddenly (in the larger lower leaves) terminating in a small, cordate base; midrib red above. *h.* 4ft. Columbia, 1867. An almost silky-pubescent shrub. (B. M. 5669.)

R. racemosa (raceme-flowered). *fl.* white; cymes in axillary, glabrous, racemiform, peduncled panicles. Summer. *l.* elliptic-oblong, 3in. long, pointed, glabrous; stipules deltoid, villous within. *h.* 5ft. Jamaica, 1820.

R. speciosa (showy). A synonym of *R. odorata.*

R. thyrsoidea (thyrse-flowered). *fl.* rusty-yellowish, externally pubescent; cymes in axillary, hoary-pubescent, pyramidal panicles. July. *l.* ovate or elliptic, 3in. to 6in. long, pointed, glabrous above, puberulous with scattered, minute down beneath; stipules deltoid-subulate, strigose within. *h.* 6ft. Jamaica, 1819.

R. versicolor (various-coloured). A synonym of *R. amœna.*

RONNBERGIA (named in honour of M. Ronnberg, Director of Agriculture and Horticulture to the Minister of the Interior of Belgium). ORD. *Bromeliaceæ*. A monotypic genus. The species is a very distinct and remarkable, stove, perennial herb. For culture, *see* **Billbergia.**

R. Morreniana (Morren's).* *fl.* blue, very similar to those of *Billbergia*, disposed in a dense, spike-formed, terminal thyrse. *l.* large, entire, long-stalked, oblong, acuminate, sub-cordate at base, bright green, zonately or transversely marked with bars and spots of a very deep green. Stem erect. New Grenada, 1874. (I. H. 1874, 177.)

RONNOWIA. A synonym of **Omphalea** (which *see*).

ROOF-FOIL. Ruskin's suggested name for the House-leek.

ROOT. *See* **Radix.**

ROOTERIES. These are formed by arranging old roots of trees over a mound of soil, and inserting trailing plants, hardy Ferns, &c., to grow and cover them. Used as a screen, this arrangement is often most effectual; and otherwise valueless tree-stumps may be utilised in place of stones, which are not always to be obtained, for making a rockery instead. One objection to Rooteries is that they often afford a hiding-place and home for numerous kinds of vermin. Rooteries may be piled up in almost any shape, and made to produce, when furnished, a good effect.

ROOT-GRAFTING. *See* **Grafting.**

ROOT-HAIRS. Attenuated, unicellular outgrowths, or hairs, from the newly-formed parts of a root.

ROOTLET. A very slender root, or branch of a root.

ROOT OF SCARCITY. A name applied to the Mangel-Wurzel (*Beta vulgaris macrorhiza*).

ROOT-PRUNING. *See* **Pruning.**

ROOTSTOCK. *See* **Rhizome.**

ROOT-SUCKERS. Shoots which proceed from the root of a plant, and afford, in many instances, a method of increase. *See* **Propagation.**

ROPALA. A synonym of **Roupala** (which *see*).

ROPE GRASS. *See* **Restio.**

ROSA (the old Latin name, from the Greek *rhodon*, which again is taken from the Arabic *ward*, a rose). Rose. Including *Lowea*. ORD. *Rosaceæ*. An important genus of highly ornamental, mostly hardy, erect, sarmentose, or tall climbing, glabrous, silky or glandular-pilose, usually prickly shrubs, dispersed over the whole temperate and sub-alpine regions of the Northern hemisphere, rare in America, extending South as far as Abyssinia, the East Indian Peninsula, and Mexico. About 250 species have been enumerated, and more than 180 described as such, but the number specifically distinct is probably not more than thirty or forty. Flowers white, yellow, pink, or red, ample, showy, solitary or corymbose; calyx ebracteolate, the tube globose, urceolate or ventricose, the throat constricted, the lobes five, very rarely four, spreading, leafy, often pinnatisect, deciduous or persistent, imbricated; petals five, very rarely four, spreading; stamens numerous, in many series, inserted on the disk, the filaments filiform; carpels indefinite, rarely few, free; styles exserted; achenes numerous, included within the baccate tube of the calyx, which, in the fruiting state, is often edible. Leaves alternate, impari-pinnate, very rarely one-foliolate or consisting solely of connate,

FIG. 383. ROSE LEAF, showing Adnate Stipules.

leafy stipules; leaflets often serrated; stipules sheathing at base, and adnate with the petioles (see Fig. 383).

The enumeration of species described in this work is slightly modified from Mr. Baker's admirable "Classification of Garden Roses," which appeared in the "Gardeners' Chronicle" of 1885.

Analytical Key to the Groups.

Leaves simple, exstipulate	1. SIMPLICIFOLIÆ.
Leaves compound, stipulate. Styles forming a column, protruded beyond the disk	2. SYSTYLÆ.
Styles not united nor protruded beyond the disk. Stipules nearly free, deciduous; Stipules adnate above the middle, persistent	3. BANKSIANÆ.

DIACANTHÆ.—Main prickles in pairs at the base of the leaves.

Fruit persistently pilose	4. BRACTEATÆ.
Fruit glabrous	5. CINNAMOMEÆ.

HETERACANTHÆ.—Prickles scattered, numerous, passing gradually into aciculi and setæ.

Leaves not rugose; large prickles long and slender	6. PIMPINELLIFOLIÆ.
Leaves rugose, coriaceous; large prickles short and stout	7. CENTIFOLIÆ.

Rosa—*continued.*

HOMOECANTHÆ.—Prickles scattered, comparatively few, sub-equal.

Prickles slender; leaves not glandular below	8. VILLOSÆ.
Prickles stout and hooked; leaves not glandular below	9. CANINÆ.
Leaves very glandular beneath	10. RUBIGINOSÆ.

GROUP I. SIMPLICIFOLIÆ.

simplicifolia

GROUP II. SYSTYLÆ.

abyssinica
moschata
multiflora
phœnicia
repens
sempervirens
setigera
stylosa

GROUP III. BANKSIANÆ.

Banksiæ
Fortuneana
microcarpa
sinica

GROUP IV. BRACTEATÆ.

bracteata
involucrata

GROUP V. CINNAMOMEÆ.

In some of these there are only the pairs of prickles at the base of the leaves; but in several of the species there are few or many aciculi in addition. These latter form a connecting link between Groups V. and VI.

anserinæfolia
blanda
carolina
cinnamomea
gymnocarpa
humilis
laxa
lucida
microphylla
nitida
nutkana
pisocarpa
rugosa
sericea

GROUP VI. PIMPINELLIFOLIÆ.

acicularis
alpina
Ecae
hemisphærica
hibernica
hispida
involuta
lutea
macrophylla
rubella
spinosissima
Webbiana

GROUP VII. CENTIFOLIÆ.

centifolia
damascena
gallica
turbinata

GROUP VIII. VILLOSÆ.

Hackeliana
mollis
orientalis
tomentosa

GROUP IX. CANINÆ.

alba
canina
indica
montana
rubrifolia

GROUP X. RUBIGINOSÆ.

ferox
glutinosa
micrantha
rubiginosa
sepium

Throughout the vegetable kingdom, there is no genus which commands—and receives—so much attention from

Rosa—*continued.*

horticulturists as that now under consideration. The Rose has been immortalised, from the most ancient times, by authors and poets of all countries. As the emblem of Youth, it was dedicated to Aurora; of Love and Beauty, to Venus; of Danger and Fugacity, to Cupid. It was given by the latter, according to classical writers, as a bribe to Harpocrates the God of Silence: hence, undoubtedly, the origin of the common expression, "under the rose." The Rose is the national emblem of England. Apart from the value of the genus as an unrivalled collection of the most beautiful floral objects, it forms an important factor in commerce. The raising of new varieties, &c., and the manufacture of rosewater and attar, give employment to thousands of persons. *Rosa* is also a prominent contributor to our Materia Medica: according to Dr. Lindley, "one of the most earnest defenders of its powers has not hesitated to assure the world that the Pharmacopœia should be formed of Roses alone"! (Introduction to "Rosarum Monographia," 1820.) The Rose, is justly designated the Queen of Flowers. Its easy mode of propagation, its adaptability to meet the requirements of most cases where flowers are needed, and its general floriferous habit, under varied circumstances, are all well-known characteristics. In horticultural exhibitions, throughout the summer, Roses are always largely represented, and many beautiful shows are limited almost exclusively to this one flower alone. For cut flowers, too, Roses are unequalled, and they may be procured, under cultivation, at almost all seasons, especially the invaluable Tea section. For covering arbours, arches, walls, &c., the climbing varieties, which include a good selection, are admirably adapted; while there are hosts of others, suitable for beds by themselves, mixed borders, culture in pots, and for any other purposes where their flowers can be admired. In some places, a Rose Garden is established, and planted with the various sections of the genus; the original species, and those of more recent introduction, are available for affording much interest and beauty in wild gardens, and often for climbing up tall shrubs and trees; several of the dwarf-growing ones are useful for rockeries. It is needless to attempt referring to all the purposes for which the Rose is so well adapted; they are generally familiar, and numerous other books and periodicals refer to the subject in more lengthened terms than is necessary or even possible here. Many of the species are very beautiful, because of the numerous bright-coloured fruits, called "hips," which succeed the flowers. Even the common Dog Rose (*R. canina*) is very ornamental in this respect; and the beautiful *R. rugosa*, where it succeeds, is covered with large fruits towards autumn, while it also continues more or less plentifully to keep flowering. The common Sweetbriar Rose, and many others, are familiar examples, because of their highly-coloured hips.

PROPAGATION. Rose propagation may be accomplished in many ways, namely, by seeds, cuttings, layers, suckers, and sports; sometimes by division; and very extensively by budding and grafting.

Seeds. Raising Roses from seeds is a practice seldom resorted to except for obtaining new and improved varieties. As a rule, only an exceedingly small percentage of seedlings fulfil these conditions, now that good sorts are so numerous; by far the largest majority will be found worthless. When seeds are to be saved, the hips must remain on the plant until quite ripe, when they should be gathered, dried in the sun, and afterwards rubbed out. The seeds may either be sown at once, or the hips may be kept whole, and stored in sand or soil, until spring. Rats and mice are very partial to the seeds, which they devour greedily; it is, therefore, necessary to make provision, as far as possible, against their attacks. Birds are also destructive in the seed-bed, if this is in the open ground. Rose seeds may be sown in a warm, sheltered position in the open

Rosa—*continued.*

air, or in pans or shallow boxes of sandy soil, which may afterwards be placed in a cold frame. The seeds vary a great deal in the time they take to germinate; some seedlings appear the first season, many not until the second. The first autumn, all that are large enough to handle should be transplanted from 6in. to 12in. apart, according to their different sizes, and protection must be provided for these, and for others in seed-beds, throughout the winter. Seedling Roses do not produce their first flowers at any fixed time; some blossom in less than a year, but many more do so the second season, while others take a longer period. The first flowers indicate little beyond the colour; those which follow are often of far better substance and superior merit.

Cuttings. Roses of all kinds on their own roots are now much favoured, and propagation by means of cuttings may be successfully practised from spring until late in autumn. Formerly, the method chiefly adopted was by cuttings made of dormant shoots, and inserted in autumn; and this is still extensively practised. The mode of procedure with ripened cuttings in autumn is very easily explained, and, if the cuttings are good and properly inserted, success is almost as certain as with cuttings of Gooseberries or Currants. Rose cuttings should be made from wood of the current year, which should be of medium strength, and well ripened. They may be cut from 9in. to 12in. in length, and if a heel can be obtained, so much the better, but this is not absolutely essential for striking them. The Hybrid Perpetuals, and any others which are equally as hardy as, or more than, these, may be inserted in the open ground. They should be placed about 6in. deep, and from 1ft. to 1½ft. apart. The best plan is to dig the soil and insert cuttings as the work proceeds; care must be taken to tread round them thoroughly, in order that frost may not lift them out. In preparing cuttings for insertion, none of the eyes should be removed, as frequently, when the upper portion of the cutting dies, shoots proceed from the joints beneath ground, and so the plant is safe. This is one of the advantages Roses raised from cuttings always have over those worked on another stock, namely, that all the shoots thrown up at any time are those of the Rose itself, and if the upper branches are cut down by frost, in all probability the lower portion of the stem will escape injury. Occasionally, after a sharp spell of frost, it will be necessary to tread round cuttings inserted in the previous autumn, to keep them firm and in position. Good plants will be ready for lifting in the course of a year, when they should be transferred to permanent positions for flowering. Cuttings of Tea-scented and other somewhat tender Roses, when inserted in autumn, will not succeed under the system above described; they must be more carefully treated, by being placed in pots of sandy soil, and provided with protection under glass. They may be dibbled in rather close, and merely kept in a cold frame through winter, during which time they will form a callus, and be ready for emitting roots when subjected to a little heat in spring. This valuable section is more generally propagated in summer; but in autumn ripened cuttings may be procured from outside plants, when there are none grown in pots.

Cuttings of Roses may be readily rooted at almost any time during summer, when suitable firm, partially-ripened growths can be obtained. The leaves at this season should be carefully preserved, and cuttings with two or three eyes may be successfully rooted. The first batch may generally be procured early in the season, from plants that have been forced, and none are better suited for propagating. If inserted, and placed in a close frame with a little heat, or on a slight hotbed, and kept moist and shaded, roots will, as a rule, soon be emitted, and the young plants may then be potted off singly, and still

Rosa—*continued.*

grown on for a time under similar conditions until they are sufficiently established to be inured to cooler quarters, gradually hardened, and eventually placed in the open air. At the middle, and towards the latter part, of summer, Rose cuttings, with leaves attached, may be readily rooted under what is termed cool treatment in the open air. A shady position is essential, such as is frequently obtainable against the back wall of a forcing or other plant house which faces south. Bell or hand-glasses are often used; but a better plan is to prepare some sandy soil, and to use the framework of an ordinary rough box, about 10in. deep, and without either bottom or top. Place this on the border, should there be one, put in about 3in. of prepared soil, press it firm, and lay some sand over the surface. All this should be made ready before the cuttings are detached, as they are much injured if allowed to lie about, if only for a short time, before being inserted. Dibble them in rather close, and give a good watering afterwards; make the top as nearly as possible air-tight, by fitting large panes of glass closely to cover it. On the north side of a lean-to house, if this situation is available, but little shading will be necessary, and it is best to leave the glass on without ever removing it until the cuttings show signs of making roots; air may then be gradually admitted. The young plants may be lifted so soon as they are sufficiently established, potted up, and placed in a close frame for a few days; afterwards harden, and get them well ripened before winter.

Layers. Propagation by layering is a sure method of increasing dwarf or weeping Roses that may be brought to the ground, but it is not extensively practised. By layering in June, and early in July, if suitable, firm wood of the current year can be obtained, the rooted plants may be detached the following autumn. When the work is deferred till later in the season, they are not usually ready for removal until the following year. Layering with a tongue is the most successful method. *See* **Layering.**

Suckers. Suckers are sometimes produced by Roses, and may be utilised for increasing stock, if desired. They should be taken off in autumn, and planted out separately; if there are no roots, some will generally form if the suckers are inserted rather deeply in sandy soil, and nursed a little through winter.

Sports. Several varieties have originated from sports that have been observed on Roses, as well as on many other plants, and which arise from some cause which seems to affect the colour more than any other quality. Sports cannot be artificially produced; all that can be done is to perpetuate any which appear, and are worthy of it, by one of the ordinary methods of propagation.

Division. Propagating Roses by division is not much practised, but it may be adopted with such as the Fairy Rose (*R. indica minima*), the Scotch Rose (*R. spinosissima*), and a few others, which spread and grow, as it were, into bushes.

Budding. This is the principal mode of propagating Roses, and the operation is one which may be successfully carried out at the proper season, after a little practice, by almost anyone. Nurserymen who make Roses a speciality have thousands budded annually. Various stocks are used, that most extensively employed being, perhaps, the common Dog Rose of the hedgerows. Stocks obtained from the seed of this plant are also much favoured, in some establishments, for dwarf Roses, particularly Teas. The Manetti is also largely employed. For effecting a union, it is necessary that the stock be in a growing state, sufficiently so to allow of its bark separating freely from the wood beneath. The buds should be dormant, well matured, and preferably obtained from firm shoots that have borne flowers; sappy

Rosa—*continued.*

wood shoots are unsuitable. The latter part of June, and all through July, is the principal season for Rose-budding outside, as the stocks are then in a growing state, and plenty of buds are generally obtainable. Under glass, and with the stocks established in pots, it may be carried out extensively earlier in the season; according as buds can be obtained, the stocks may be introduced into a slight warmth, and soon brought into proper condition. On the process of preparing and inserting buds, full information may be found under **Budding,** where also further remarks are made on the various stocks that are used for Roses.

Grafting. This is an effectual mode of Rose propagation; the whip or splice method and crown-grafting are best suited, but the parts rarely unite so well as they do when budded. Cleft and saddle-grafting are also practicable. Stocks may be of the same sorts as those used for budding. The work is performed principally in January and February under glass, and in the open air during March. When the stocks are in pots, they may be started in a little heat, and so got in advance of the scions, which may be procured in about a fortnight afterwards from well-ripened, dormant trees outside. After the grafts are inserted, the stocks should be returned to the same heat as that in which they have been growing, until a union between the parts has taken place, when they may be gradually hardened off and grown in cooler and more suitable quarters. For description of the methods of grafting above named, *see* **Grafting.**

CULTIVATION. To grow Roses successfully, a rich soil must be provided, such as a deep loam of a stiff rather than light nature, although the plants on their own roots will thrive better in rather light soils than will others worked on the common tall Briar or on seedling Briar stocks. The wild Rose grows naturally in heavy, clay land; under cultivation, it is, consequently, best suited with strong soil of a rich nature. Shallow, sandy or gravelly soils are unsuited for Roses, and so, on the other hand, are any which are improperly drained. In gardens where Rose-beds have to be formed in unfavourable situations, it is best to dig out the natural soil in the first place, and replace it with a properly-prepared compost; or it may be that changing a portion will suffice. A depth of about 1½ft. should be provided for such strong-growing kinds as most of the Hybrid Perpetuals, and a similar depth is advised for all Roses if it can be provided. The soil can scarcely be made too rich; plenty of manure may be added when the ground is being prepared for planting, and an annual top-dressing in addition is generally found beneficial, and indeed necessary, in the production of good flowers. It may be applied with advantage soon after growth commences, in spring; the flowering shoots are then pushing up, and need plenty of feeding from the root. Respecting situations, there are few in which some representative of this beautiful genus may not be grown successfully. It is not convenient, nor, perhaps, desirable, to attempt the formation of a Rose-garden in all gardens, even when they are extensive; but beds of Roses may generally be introduced into flower-gardens and pleasure-grounds, and any quantity of plants, so far as circumstances and space admit, may be put into other positions without any fear being entertained of having too many. For cutting purposes, in private establishments, it is found a good plan to devote a portion of the kitchen garden to Rose-growing, where the ground can be well trenched previous to planting, and enriched with manure at any time when it is considered necessary. For a Rose-garden, an open situation is desirable, with a south or south-eastern aspect, and sheltered from other points, particularly north and east. Climbing Roses are very

Rosa—*continued.*

beautiful, and generally very floriferous; they may be employed with good effect for covering arches, arbours, pillars, &c., and also for training up trees and tall-growing shrubs.

Transplanting of all the more hardy Roses may best be done in October and November. Tea varieties, and any others of a tender nature, are generally not safe to withstand the winter unprotected, and are consequently planted in spring. Dwarf plants should be allowed a space of from 2ft. to 3ft. clear between them, standards not less than 3ft. Sometimes, both are planted alternately in beds. Roses are better arranged by themselves in this way than intermixed with other plants; and this remark also applies to the flowers when cut. It is so customary to find Roses mixed with well-nigh everything in the way of cut flowers that few persons keep them exclusively by themselves; but it is only by doing so that their full beauty as cut flowers may be seen The foliage, too, that belongs to plants from which the flowers have been cut seems to suit each so well individually that some of it should always be used; the foliage, for instance, from Tea Roses does not look well with Hybrid Perpetuals, that of neither sort of leaves will do for mixing with flowers from any of the species, and so forth.

The pruning of different Roses depends a good deal on the class to which they belong, the way in which they are trained, &c. Autumn and spring pruning are practised, the latter most extensively, especially since the springs of late years have been so precarious. If a shoot is shortened back in autumn, the eyes that are left, with the intention of their remaining dormant until the following spring, will often be excited into growth during winter, because of the prevalence of mild weather; they then succumb to the first frost. Spring pruning may generally be performed from the middle to the end of March; but the season varies according to the weather and the state of the trees. The young shoots will frequently grow out several inches at the top; and although this growth will have to be sacrificed, it would be unsafe to prune, unless the season were sufficiently advanced to insure the development of the eyes that are left, without injury from frost. Standard Hybrid Perpetuals have to be cut rather severely to keep their heads within limits. All small shoots should be kept removed, and the strongest ones allowed plenty of space. Dwarf plants of this class may be allowed to grow more freely; but the shoots must be kept thinned, in order that they may become thoroughly ripened. Badly-ripened wood never bears good flowers; it should, therefore, in pruning, be removed first, and afterwards other shoots which are misplaced or tend to cross each other and destroy the form and symmetry of the trees. Hybrid Perpetuals may be cut back to from four to eight eyes, according to their vigour and habit. Teas, in the open air, with a few exceptions, seldom grow very vigorously, and a thinning and slight shortening of the shoots are often all they need. Hardy Pillar and Climbing Roses, such as varieties of *R. sempervirens*, may have their lateral growths shortened back after flowering; this admits light and air to the others left, and but little further pruning will be necessary in spring. If more vigorous shoots are required than those which develop, hard pruning to two or three eyes will cause their production. The amount of pruning which Roses need, and the time and manner of performing the operation, are subjects very widely discussed, and upon which much difference of opinion exists. The principal conditions are: judgment on the part of the operator, a knowledge of the varied habits of Roses, and treatment of each individually as its requirements suggest.

Roses in Pots and under Glass. Greenhouses and conservatories without Roses are rarely found, as, fortunately, no one with a cool glass house need be afraid of

Rosa—*continued.*

inserting a plant to cover the back wall or a portion of the roof, if pot culture cannot be attempted. The Teas are especially well suited for pots, and also the Hybrid Perpetuals; with a sufficient quantity of plants, and by forcing and management, flowers may be obtained nearly or quite the whole year through. Plants for pot culture are best on their own roots—that is, raised from cuttings or layers—but others worked on Manetti stocks or seedling Briars are available. They may be grown from the first in pots, or lifted from the open ground, in September or October, and potted. A rich compost of turfy loam should be provided, with some decayed manure, charcoal, and, if convenient, a few ½in. crushed bones intermixed. If the plants are intended for forcing, they should be established in pots at least for a season; the flowers seldom develop properly on those lifted only a short time from the open ground. The Hybrid Perpetuals may be plunged outside during winter, or until required for forcing, and protected with dry litter or bracken; the Teas should be placed for safety in a cool house or pit. As the growth allowed in pots must be somewhat limited, close pruning will be necessary, particularly in the early stages of training, and the shoots must always be kept well thinned by summer disbudding. Established plants do not need repotting every year; if their roots are healthy and not pot-bound, a top-dressing of rich soil sometimes answers better than potting, and liquid manure may be given when the flowers are developing.

For forcing Roses to flower in early spring, artificial heat is necessary, and the plants should have been grown some time previously in pots, as already noted. After being pruned and otherwise prepared, a portion may be introduced into a little heat during December, or early in January. About 50deg. at first will suffice, but when growth commences, and the days lengthen, this may gradually be raised to about 65deg., with plenty of air on all favourable occasions. Syringing may be practised daily until the flowers begin to expand, when the plants may be transferred to a cool greenhouse, unless they are only required for providing cut flowers, when they should be subjected to a cool temperature and plenty of air. After flowering, the plants may be placed in a sunny position outside until the autumn, but they must not be neglected in watering: the proper maturation of the wood for the succeeding year must be one of the main objects in view.

Other methods of growing Roses have to be adopted when the plants are trained to a greenhouse roof or rafter. For this purpose, they are best planted in a prepared border, which may usually be made inside the house; good soil and drainage must be provided here, as in other situations. Nurserymen supply pot plants specially grown with long shoots for training; or the growths may be easily trained up, if a light, suitable position can be provided, which, however, is not always convenient when stages and hot-water pipes come in the way. Roses permanently planted under glass must be allowed their full season of rest all the winter; their roots should then be kept moderately dry, but almost any quantity of water may be given during the summer. Thinning of the numerous flowerless shoots which appear must be constantly attended to in the growing season. This will admit light and air, and prevent the necessity of removing the large quantity of wood at pruning time that would otherwise be necessary. Many climbing varieties of Tea Roses are unsurpassed amongst greenhouse climbers during spring and summer.

FUNGI. Several species of Fungi, belonging to widely different groups, are parasitic upon the living leaves and young branches of cultivated Roses, and many others are found growing upon dead and withered parts of the plants. The latter do not need further mention, though

Rosa—*continued.*

possibly some of them may be injurious, in their younger stages, to living parts of the Rose-plants. The most generally hurtful of all the true parasitic Fungi is Rose Blight, which is one of the so-called Mildews, and belongs to the group of *Erysipheæ* (*see* **Mildew** and **Oidium**). Its scientific name is *Sphærotheca pannosa*, but it differs generically from *Erysiphe* in little save that in each of the minute, black perithecia scattered over the mycelium there is only one ascus. In this lie eight oval spores. *S. pannosa* grows on all young parts of plants in the form of a dense, pale grey, velvety coat, covering large patches of the surface. The parts attacked by it are much altered in appearance, the leaves becoming blistered and twisted, and the flower-stalks and calyces swollen and distorted. An account of the structure of the Fungi in this family will be found under the headings quoted above. *S. pannosa* is found to grow also on the Peach. The application of powdered sulphur, or of weak solution of sulphide of potassium, will destroy the Fungus without injury to the host-plant.

Another kind of Mildew has been observed on the lower surface of the leaves of Roses in conservatories. This also forms grey patches, but they are less extensive and far less dense than in the former species. Irregular, brownish spots appear on the upper surface of the leaves; they extend over the leaves, which soon wither. These are the work of *Peronospora sparsa*, and bear scattered conidiophores, or slender, branched stalks, on which oval conidia are produced, on the tips of the branches. No remedy is known for this Fungus; and all parts that bear it should be cut off and destroyed. *See* **Peronospora**.

The Rose Rust (*Uredo* or *Lecythea Rosæ*) and the Rose Brand (*Phragmidium mucronatum*) are believed to be forms of a single species of Fungus, the *Uredo* being the summer form of spore, and the *Phragmidium* the autumn form, or teleutospore. Both forms occur scattered in small masses on the lower surface of the leaves; indeed, they grow on the same patches of mycelium; but the Brand appears later in the season. The Rust consists of pale yellow, one-celled, round or oval bodies, covered with very fine, prickly warts. The Brand is made up of very different spores, since each is formed of a row of from four to nine cells, which have a brown, warty outer coat. Each spore is borne on a long stalk, thickened below; and each ends, at the tip, in a long, conical, colourless papilla or outgrowth. This Fungus is seldom dangerous to Roses; but it renders the leaves unsightly. Unfortunately, no cure is known; hence, it is advisable to remove and to burn such leaves as show traces of the Fungus, to prevent it from spreading to healthy plants. *See* **Phragmidium**.

Another Fungus that, at times, renders the leaves of Roses unsightly, is that known as *Asteroma Rosæ*, Lib. (*Actinonema Rosæ*, Fr.), which forms dark purplish-brown spots, with the appearance of fibres radiating from the centre of each. In the spots lie scattered, dark pycnidia, containing two-celled spores. This Fungus is probably only an immature condition of some unknown pyrenomycetous Fungus. To prevent any extension of the slight harm done by it, remove and burn affected leaves.

The leaves are liable to become covered, on the upper surface, with a sooty deposit, imperfect conditions of species of *Capnodium*. *C. Persoonii* has been recorded from Roses on the Continent; but probably the species varies. The Fungus grows chiefly in the secretions of the Aphides so common on Roses; the dark crust obstructs access of light and air to the leaves. The best remedy is to get rid of the Aphides, and to clean the leaves, and keep them clean by syringing or sponging.

INSECTS. In Kaltenbach's "Pflanzenfeinde," nearly 100 species of insects are recorded as more or less hurtful to Roses, *i.e.*, by feeding upon them as larvæ or

Rosa—*continued.*

as perfect insects; and to that number many more could now be added. Hence, only such as are markedly hurtful to these favourite flowers are selected for notice here.

The roots may, at times, be damaged by larvæ of Cockchafers, and other subterranean foes; but these need not detain us. The larvæ of *Agrilus viridis* feed below the bark on stems of Roses, usually close to the origin of a branch. The beetles are from $\frac{1}{5}$in. to $\frac{2}{7}$in. long, rather narrow, and brassy-green or blue; they are not uncommon in the South of England.

The twigs and young leaves are much injured by Aphides or Green Flies, of which five species are recorded, with descriptions and coloured figures, in Buckton's "British Aphides," as feeding on Roses. Of these,

FIG. 384. APHIS (SIPHONOPHORA) ROSÆ—*a*, Line showing the natural length.

Siphonophora Rosæ (see Fig. 384), *S. rosarum*, and *S. dirhoda*, are often very plentiful on Sweet Briar and on the Cabbage Rose, and also attack the wild Dog Rose. Evergreen Roses seem less liable to be injured by them. The other kinds of Aphides are less evidently hurtful. All of them may be treated in the same way. The remedies recommended under **Aphides** will be found useful. It is desirable to keep the plants as free as possible from these insects, alike because of the sap they abstract, and because of their excretions covering the leaves and obstructing the functions of the latter, as well as affording a medium for the growth of dark-coloured Fungi, which still further interfere with the welfare of the plants. The larvæ of a small Moth (*Spilonota roborata*), and those of a Sawfly (*Pœcilosoma candidatum*), bore into the pith of Rose-branches from May to July, of course killing them, and causing the leaves on them to wither. The latter insect has been observed near Oxford by Prof. Westwood, but is, fortunately, rare. The infested branches should be cut off and destroyed while still tenanted by the larvæ. The leaves of Rose-bushes are devoured by numerous insects, mostly Moths and Sawflies. Of the larger Moths, there may be named the **Lackey Moth**, the Gold-tail Moth and its allies (*see* **Liparis**), the Vapourer Moth (*see* **Orgyia antiqua**), the **Bufftip Moth** (*Pygæra bucephala*), the **Winter Moth** (*Cheimatobia brumata*), and the Barred Yellow Moth (*Cidaria fulvata*). Each of these, save the last, will be found described under the headings quoted. *Cidaria fulvata* is a Geometer, about 1in. in spread of wings, with a slender body. It is yellow, with a broad, brown, angled band crossing the front wings, and a pale, triangular spot at the tip, bordered below by a short, dark streak. The larvæ of these moths should be shaken or picked off the bushes, collected, and destroyed. Those of the Winter Moth live between leaflets united by threads of silk. The females of this very destructive species are unable to fly,

Rosa—*continued.*

since their wings are too small to be of use. Hence, they can be prevented from reaching the buds to lay their eggs in them, if the stems and supports of the plants have a belt of any sticky substance (*e.g.*, tar, alone or mixed with grease) smeared on them, and occasionally renewed between November and January, since it is at this season that the moths emerge from the pupæ in the soil.

Among the smaller Moths, a good many species of **Tortricina** (which *see*) feed in leaves of Roses, either joining the leaflets by means of silk threads, or rolling them up in tubes, in which the larvæ live. They may either become pupæ in these shelters, or may lower themselves, when full-fed, to the soil, in which they become pupæ. The larvæ have the habit of lowering themselves by silk threads when the branches are jarred, and advantage may be taken of this habit by placing something below to catch them. Among the commoner and more harmful are *Lozotænia rosana*, *Pardia tripunctana*, *Croesia Bergmanniana*, and *Peronea variegana*; but a good many others might be named which feed on Roses, as well as on other plants. The larvæ of all have much the same habits, and it would occupy too much space to proceed here to distinguish them from one another. In the large group of moths known as *Tineina* (*see* **Moths**), there are a good many that live on Roses. Some of these live in the same manner as the *Tortricina*; but the larvæ of others, belonging to the genera *Nepticula*, *Tischeria*, &c., mine between the surfaces of the leaflets, and disfigure them with pale, wavy lines or blotches. These mines do comparatively little injury to the plants. When desirable, the larvæ may be killed in them by pressure between the finger and thumb, and the numbers may thus be kept down.

The Sawflies (*Tenthredinidæ*) are frequently far more hurtful than the Moths to Rose-bushes, and the number of kinds which, as larvæ, feed on the leaves of Roses, either entirely or partially, is pretty large. For an account of these insects, and of the remedies to be employed, *see* **Rose Sawflies.**

Several gall-flies make galls upon the young twigs and on the leaves: for an account of these, *see* **Rose Galls.** *Typhlocyba Rosæ*, a small insect nearly related to the Frog-hopper (*Aphrophora spumaria*), is often plentiful in all stages on, and is hurtful to, Roses, as well as to Apple-trees. Frequently, large numbers of these insects are to be found on the lower surfaces of the leaves. They are about $\frac{1}{6}$in. long, pale yellow or whitish, with brown feet; the front wings transparent, rarely yellow along the edges; hind wings milky white. The best remedy is said to be the removal and burning of all superfluous branches in early spring.

The flowers are often gnawed and damaged by Beetles; of these, the worst are the **Rosechafer** (which *see*), and the Bracken Clock (*Phyllopertha horticola*, see Fig.

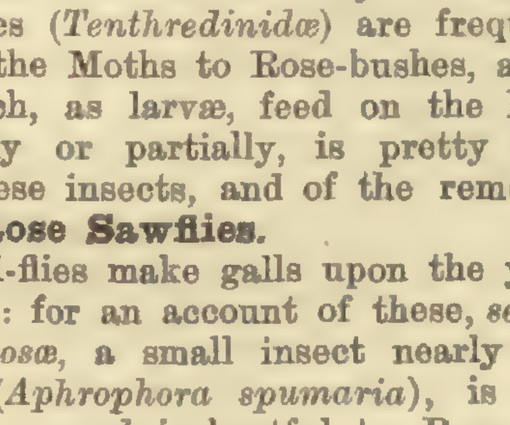

FIG. 385. BRACKEN CLOCK (PHYLLOPERTHA HORTICOLA)—*a* Foot much magnified.

385), both of which are addicted to eating out the stamens and pistils of Roses, Strawberries, fruit-trees, &c. *P. horticola* is peculiarly abundant in the North. It is about $\frac{1}{4}$in. to $\frac{1}{3}$in. long, green or blue, and pubescent, with rusty-red or bluish-black wing-cases, and a pitted

Rosa—*continued.*

thorax. Where troublesome, the insects may be shaken off the bushes on dull days, and readily captured; on fine days, they are too active to permit of this remedy.

R. abyssinica (Abyssinian). *fl.* white; calyx and peduncles thickly downy. June. *l.*, leaflets shortly stalked, broader towards the point than at the base; petioles very rough with unequal glands and bristles. Prickles very numerous and strong. Otherwise resembling *R. sempervirens*. Abyssinia. (L. R. 13.)

R. acicularis (needle-prickled).* *fl.* pale blush, solitary, fragrant; calyx tube naked; sepals somewhat divided, hairy, longer than the tube; petals obovate, emarginate, spreading, shorter than the sepals; bracts ovate, convex. June. *fr.* yellowish-orange, obovate. *l.* dense, opaque, very glaucous; leaflets about seven, oval, convex, slightly rugose, simply serrated; stipules narrow; petioles naked or a little hairy. Branches erect, clothed with slender, straight prickles and a few bristles. *h.* 8ft. North temperate zone, 1805. (L. R. 8.)

R. alba (white).* *fl.* white or delicate blush, gratefully fragrant; sepals pinnate, reflexed. June and July. *fr.* scarlet or blood-coloured, oblong, unarmed. *l.*, leaflets oblong, glaucous, nearly naked above, simply serrated. Prickles nearly straight or falcate, slender or strong; bristles none. *h.* 4ft. to 7ft. Of garden origin, 1597. Of this plant, which Mr. Baker regards as probably a cross between *R. canina* and *R. gallica*, there are many varieties.

R. alpina (alpine).* *fl.* pink or rose-red, solitary; sepals undivided, spreading; petals obcordate, concave; peduncles after flowering deflexed, and, as well as the calyx, hispid or smooth. June. *fr.* orange-red, ovate or rarely sub-globose, pendulous, more or less elongated. *l.*, leaflets five to eleven, ovate or obovate, argutely or doubly serrated. Young stems prickly; old ones usually naked. *h.* 3ft. Europe, 1683. Of this species there are several varieties. *R. pendulina* is a form with a smooth calyx and elongated, hispid peduncles. *R. pyrenaica* is a form with calyx and peduncles hispid. (B. M. 6724.)

R. anserinæfolia (Anserina-leaved). *fl.* white, in few or many-flowered corymbs, shortly pedicellate; sepals caudate-acuminate, deciduous. Summer. *fr.* smooth, $\frac{1}{4}$in. in diameter. *l.* 1in. to 3in. long; leaflets broadly elliptic, obtuse, simply serrated, $\frac{1}{3}$in. to $\frac{2}{3}$in. long; petioles slender. Branches with few or many unequal, stout, compressed, hooked prickles. *h.* 10ft. Orient. Plant sub-scandent.

R. arvensis (field-loving). A synonym of *R. repens*.

R. Banksiæ (Lady Banks').* *fl.* white and very double, nodding, numerous, small, weakly but pleasantly scented; calyx tube hemispherical; sepals entire, pointed; peduncles naked, very slender. June. *l.*, leaflets one to five, flat, oblong-lanceolate, obtuse, often waved, simply serrated, very hairy at base of middle nerve; petioles naked, rarely hairy. Branches unarmed, weak, climbing. *h.* 20ft. China, 1809. (B. M. 1924; B. R. 397.)

R. B. lutea (yellow). A yellow-flowered variety. (B. R. 1105.)

R. berberifolia (Berberis-leaved). A synonym of *R. simplicifolia*.

R. blanda (charming).* *fl.* rose-coloured, one to three; calyx tube and peduncles smooth and glaucous. May and June. *fr.* globose. *l.*, leaflets five to seven, oval or oblong, obtuse, pale on both sides and minutely downy or hoary beneath, serrated; stipules large. *h.* 1ft. to 3ft. North America. Plant nearly unarmed, or with scattered, straight, deciduous prickles. SYNS. *R. fraxinifolia* (B. R. 458), *R. Woodsii* (B. R. 976).

R. bracteata (large-bracted).* Macartney Rose. *fl.* white, large, solitary, terminal; calyx, as well as the short peduncles, densely tomentose; bracts large, surrounding the base of the calyx. July. *l.*, leaflets five to nine, obovate, slightly serrated, shining, glabrous; stipules nearly free, bristly. Branches erect, tomentose, armed with strong, recurved, often twin, prickles. *h.* 2ft. China, 1795.

R. b. scabriuscula (slightly scabrous). Branches bristly; prickles smaller than in the type, nearly straight. (B. M. 1377, under name of *R. bracteata*.)

R. Brunonii (Brown's). A synonym of *R. moschata*.

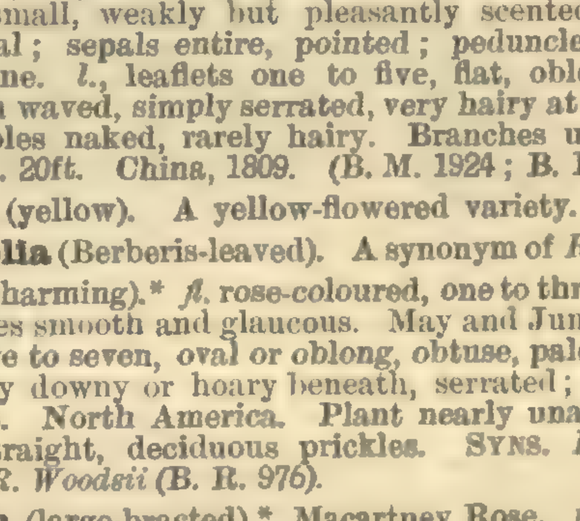

FIG. 386. ROSA CANINA.

R. canina (canine).* Dog Rose. *fl.* usually pink, sometimes solitary, or with many in a cluster; sepals usually naked, re-

Rosa—*continued.*

flexed, pinnate; styles free or nearly so, hirsute. June to August. *fr.* ovoid, urceolate, or sub-globose, the mouth of the disk conspicuous. *l.*, leaflets eglandular (rarely, except on the midrib and veins beneath), glabrous or thinly hairy, acute, very sharply toothed. Branches long, arching. *h.* 6ft. to 8ft. Europe (Britain), Orient. "Varieties innumerable: 150 are treated as species in Déséglise's 'Catalogue of the Roses of Europe and Asia.' One series of forms has erect, sub-persistent sepals, and another leaves slightly glandular beneath" (Baker). See Fig. 386.

R. carolina (Carolina). Swamp Rose. *fl.* pink, numerous, corymbose; calyx with leaf-like appendages, and, as well as the peduncles, glandular-bristly. June to September. *fr.* depressed-globular, somewhat bristly. *l.*, leaflets five to nine, elliptical, often acute, dull above, pale beneath; stipules narrow. Stems 4ft. to 7ft. high, armed with stout, hooked prickles, not bristly. North America, 1726. (L. R. 4.)

R. centifolia (hundred-leaved).* Cabbage Rose. *fl.* rose-purple, odorous, large; sepals spreading; petals inflexed; peduncles and calyx glandular-viscous. June and July. *fr.* ovate, somewhat pulpy, fragrant. *l.*, leaflets five to seven, ovate, flat, simply serrated, glandular on the margins, rather flaccid, slightly pilose beneath. Prickles scattered, nearly straight, scarcely dilated at base. *h.* 3ft. to 6ft. Orient, 1596. This species and its varieties have given rise to innumerable handsome garden Roses.

FIG. 387. ROSA CENTIFOLIA MUSCOSA.

R. c. muscosa (mossy).* Moss Rose. *fl.* rose or white; petals inflexed; peduncles and calyx glandular-mossy. *l.*, leaflets ovate, flat, simply serrated. Prickles unequal, small, numerous. See Fig. 387.

R. c. parviflora (small-flowered). *fl.* purple, smaller than in the type, solitary, very double, overtopped by the young shoots; sepals ovate, pointed. *l.*, leaflets small, stiff, ovate, acute, flat, very finely and simply toothed.

R. c. pomponia (Pompone). Pompone Rose. A dwarf form, having small flowers and leaves. See Fig. 388.

R. cinnamomea (Cinnamon-like). *fl.* pale or bright red, solitary or two or three together; sepals very narrow, longer than the concave, obcordate petals. May. *fr.* red, globose or spherical-ovate. *l.*, leaflets five to seven, oval-oblong, simply serrated, cinereous-pubescent beneath; stipules of the sterile branches linear-oblong, those of the flowering branches dilated above, with spreading auricles. Prickles twin, falcate, the larger ones subulate, the smaller ones bristly and not glandular. *h.* 6ft. Europe and North Asia.

R. c. dahurica (Dahurian). This resembles the type, but the stipules are narrow, and the prickles long and spreading.

R. c. majalis (May). Prickles of the flowering branches solitary, recurved. A small form.

R. damascena (Damascus).* Damask Rose. *fl.* white or red, large, more or less corymbose, sweet-smelling; calyx, as well as the peduncles, glandular-hispid, viscous; sepals reflexed. June and July. *fr.* ovate, pulpy. *l.*, leaflets five to seven, ovate, rather rigid, oblong in bud. Prickles numerous, unequal, dilated towards the base. *h.* 2ft. to 4ft. Orient, 1573. A parent of many beautiful garden forms.

R. d. variegata (variegated). *fl.* densely paniculate-corymbose. *l.*, leaflets somewhat round-ovate, variegated with yellow, pubescent on the margins.

Rosa—*continued.*

R. Ecæ (Mrs. Eca Aitchison's). *fl.* golden, solitary, less than 1in. in diameter. Summer. *fr.* globose, glabrous, shining, crowned by the reflexed calyx segments. *l.* small; leaflets five to nine, slightly glandular. Afghanistan. A much-branched, dwarf, very prickly shrub. (J. L. S. xix. 8.)

FIG. 388. ROSA CENTIFOLIA POMPONIA.

R. Eglanteria (Eglantine), of Linnæus. A synonym of *R. lutea.*

R. Eglanteria (Eglantine), of Miller. A synonym of *R. rubiginosa.*

R. ferox (fierce). *fl.* terminal, aggregate in twos or threes, rarely solitary; sepals pinnatifid, at length deflexed, deciduous; petals white, yellowish at base; peduncles short, glandular-hispid. June. *fr.* blood-coloured, naked, sub-globose. *l.*, leaflets five to seven, ovate or roundish-ovate, glandularly biserrate, nearly glabrous above, copiously glandular beneath. Branches erect; prickles thick, very unequal, dilated at base, hooked. North Asia. Plant dwarf and much-branched.

R. ferox (fierce), of Lawrence. A synonym of *R. rugosa.*

FIG. 389. ROSA GALLICA VAR.

R. Fortuneana (Fortune's). *fl.* white, double, about 3in. in diameter, solitary, on short, bristly peduncles; sepals ovate, undivided; petals loosely and irregularly arranged. June. *l.*, leaflets three to five, ovate-lanceolate, finely serrated, thin, bright green, shining on both sides; stipules small, subulate, deciduous. Branches slender, sparingly armed with small, falcate prickles. China, 1846. A scrambling, hybrid shrub, of which *R. indica* is one of the parents.

R. fraxinifolia (Ash-leaved). A synonym of *R. blanda.*

Rosa—*continued.*

R. gallica (French).* *fl.* varying from red to crimson, double or semi-double, erect; sepals spreading; peduncles and calyx glandular-hispid, somewhat viscous. June and July. *fr.* subglobose, very coriaceous. *l.*, leaflets five to seven, coriaceous, rigid, ovate or lanceolate, deflexed; stipules narrow, divaricate at apex. Prickles unequal. *h.* 2ft. to 3ft. Europe and Western Asia. A very variable plant. See Fig. 389. (B. M. Pl. 104.) *R. arvina* and *R. hybrida* are probably hybrids between this species and *R. repens*.

FIG. 390. ROSA NOISETTIANA.

R. g. Agatha. Agatha Rose. *fl.* purple, small, very double; sepals more or less pinnate; outer petals spreading, inner ones concave.

R. g. inermis (unarmed). *fl.* purple, double; calyx tube campanulate; sepals shortly and simply pinnate; peduncles scarcely glandular. Branches smooth, glabrous.

R. g. pumila (dwarf). *fl.* red, single; peduncles and calyx hispidulous-glandular, dark. *l.* roundish-ovate, rarely lanceolate, more or less keeled; stipules very narrow. Branches more or less prickly. (J. F. A. 198, under name of *R. pumila*.)

R. glutinosa (glutinous). *fl.* pale blush, small, solitary, on short, bristly-viscid stalks. June. *fr.* scarlet, without bracts, prickly, crowned by the hoary sepals. *l.* hoary; leaflets three to seven, flat, roundish, small, coarsely serrated, glandular and viscid; stipules much dilated upwards; petioles sparsely prickly. Prickles on old stems unequal, falcate. *h.* 2ft. Orient, 1821. (S. F. G. 482.)

R. gracilis (slender). A synonym of *R. involuta Sabini*.

R. gymnocarpa (naked-fruited). *fl.* red, remarkably small, solitary or sometimes in pairs; calyx segments ovate, simply acuminate, deciduous. June. *fr.* red, the size of a small pea, smooth, and naked. *l.*, leaflets five to nine, glabrous, rather distant, oval, sharply and doubly glandularly serrated. Branches glabrous, furnished with scattered, weak prickles. *h.* 1ft. to 4ft. California.

R. Hackeliana (Hackel's). *fl.* pink, minute, solitary, very shortly pedunculate; sepals undivided or pinnatifid. June. *fr.* ovate-spherical, glandular-bristly. *l.*, leaflets five to seven, small, somewhat elliptic-orbicular, obtuse, simply serrulated, tomentose on both sides, densely so beneath; stipules ovate-oblong, dilated. Prickles nearly straight or often hooked and dilated at base. South Europe. A dwarf species.

R. hemisphærica (hemispherical).* *fl.* yellow, solitary, shortly pedunculate; calyx tube hemispherical; sepals lanceolate, almost undivided; petals obovate. July. *fr.* erect, globose. *l.*, leaflets five to seven, obovate, paler beneath and pubescent on the nerves, somewhat biserrate; petioles, as well as the peduncles, slightly spiny. *h.* 3ft. Orient, 1629. SYN. *R. sulphurea* (B. R. 46).

R. hibernica (Irish). *fl.* pale pink, few or many; sepals leafy, persistent; peduncles naked. June and July. *fr.* erect, globose naked. *l.*, leaflets simply serrated, glaucous-green above, thinly hairy on the nerves beneath; petioles pubescent; stipules nearly naked on the back, the auricles gland-ciliated. Branches short; prickles rather crowded, gradually passing into bristles. *h.* 2ft. Britain. (Sy. En. B. 463.) Perhaps a hybrid between *R. canina* and *R. spinosissima*. In the variety *cordifolia* the peduncles are bristly and glandular, while in *glabra* they are naked.

R. hispida (hispid). *fl.* white, with a faint tinge of yellow, solitary; sepals lanceolate, cuspidate; petals oval, very obtuse; peduncles thickened at apex. June. *fr.* black, large, globose, glabrous. *l.*, leaflets seven, oval, serrated with acuminate teeth, glabrous; petioles unarmed. Branchlets hispid-prickly. *h.* 3ft. 1780. A garden plant. (B. M. 1570.) SYN. *R. lutescens* (L. R. 9).

R. humilis (dwarf). *fl.* pale blush, usually in pairs; sepals ovate, with a narrow point, their edges *cottony*; bracts pointed, somewhat hairy. June to August. *l.*, leaflets usually five, somewhat shining, lanceolate, acuminate, finely toothed; stipules naked, very narrow. Branches slender, reddish-brown, armed with a pair of needle-shaped prickles under the stipules. North America. A low, weak, spreading species.

R. hystrix (bristly). A variety of *R. sinica*.

R. indica (Indian).* Blush, Common China, or Monthly Rose. *fl.* red, very numerous, usually semi-double; calyx tube naked; sepals nearly simple, acuminate, deciduous, glandular outside; petals *obcordate, concave*. All seasons. *fr.* scarlet, obovate. *l.* shining, without pubescence; leaflets three to five, even, elliptic, acuminate, nearly simply crenate-serrate, dark green above, glaucous beneath; petioles rough with bristles and little, hooked prickles; stipules very narrow, subulate. Branches stout, armed with brown, hooked prickles. *h.* 4ft. to 20ft. Native country not clearly known. 1789. *R. borbonica* is probably a hybrid between *R. indica* and *R. gallica*; *R. Noisettiana* (see Fig. 390) and *R. Ternauxiana*, between *R. indica* and *R. moschata*; *R. reclinata*, between *R. indica* and *R. alpina*; *R. ruga*, between *R. i. fragrans* and *R. repens*; and *R. Fortuneana*, of Lemaire (L. J. F. 361), is doubtless also a hybrid of which *R. indica* is one of the parents.

R. i. anemonæflora (Anemone-flowered). *fl.*, calyx highly glabrous. *l.*, leaflets ovate-lanceolate, argutely serrated.

R. i. caryophylla (Clove-leaved). *fl.* rose, sub-paniculate; petals cucullately inflexed. *l.*, leaflets ample, slender.

FIG. 391. FLOWERING BRANCHLET OF ROSA INDICA FLORE-PLENO.

R. i. flore-pleno (double-flowered). This only differs from the type in having double flowers. See Fig. 391. There are a large number of garden varieties in cultivation.

R. i. fragrans (fragrant). Sweet-scented Chinese Rose. *fl.* rose-coloured, semi-double, fragrant; peduncles thickened. *fr.* ovate. *l.*, leaflets three to five, ample; stipules fringed or entire. Stem firm; prickles strong.

R. i. longifolia (long-leaved). *fl.* rose, almost single; peduncles rather rough. *l.*, leaflets three to five, long-lanceolate. Stems firm, nearly unarmed.

R. i. minima (smallest).* *fl.*, petals obovate, acuminate. *l.*, leaflets ovate, obtuse, purplish. Stem and branches prickly and bristly, or nearly glabrous. (B. M. 1762, under name of *R. semperflorens minima*.) SYN. *R. Lawrenceana* (B. R. 538). There are double-flowered forms of this which now generally pass under the name of "Fairy Rose."

R. i. semperflorens (ever-flowering). *fl.* purple, on filiform peduncles; sepals elongated, sub-appendiculate. *l.*, leaflets

Rosa—*continued.*

slender, lanceolate or ovate. Stem and branches slender and weak, prickly or unarmed. (B. M. 284, under name of *R. semperflorens*; S. E. B. 91, under name of *R. indica*.)

R. involucrata (large-involucred). *fl.* white, fragrant, 2in. to 3in. in diameter, solitary or shortly corymbose, rarely axillary and longer pedicelled; calyx tube unarmed; petals retuse; bracts large, lanceolate. July. *fr.* globose, densely tomentose. *l.* 3in. to 4in. long; leaflets three or four pairs, 1½in. long or less, elliptic or oblong, acute or acuminate, finely serrated; stipules small, laciniate. Branchlets and inflorescence densely tomentose; prickles straight, often in stipular pairs. *h.* 3ft. India, 1818. (B. R. 739; L. R. 1, under name of *R. Lyelli*.)

R. involuta (involute). *fl.* white or pink; sepals leafy, persistent, densely glandular on the back; peduncles densely bristly. June and July. *fr.* red, globose, sparingly produced. *l.*, leaflets doubly serrated, glabrous or pubescent and glandular beneath; petioles and stipules densely glandular and ciliated. Branches sometimes arching; prickles scarcely curved, crowded, gradually passing into bristles. *h.* 2ft. Europe (principally Britain). A very variable species, of which there are many distinct forms. The following may be mentioned:

R. i. Sabini (Sabin's). *fl.*, calyx tube sub-globose, more or less bristly; sepals pinnate. *fr.* sub-globose. *l.*, leaflets with copious, compound serratures, thinly pubescent above; petioles (and peduncles) densely hairy, glandular, and bristly. Prickles straight, ⅓in. long. This is the commonest form of the species. SYN. *R. gracilis*.

R. i. Wilsoni (Wilson's). *fl.*, calyx tube almost glabrous; sepals nearly simple. *fr.* sub-obovoid. *l.*, leaflets often cordate, terminal, large, glabrous above, the ribs thinly hairy and nearly glandless beneath, the serratures simple. Prickles as in *R. i. Sabini*. (Sy. En. B. 464.)

R. lævigata (smooth). A synonym of *R. sinica*.

R. Lawrenceana (Lawrence's). A synonym of *R. indica minima*.

R. laxa (loose). *fl.* solitary; calyx tube roundish, hairy, sometimes underset with floral leaves; sepals entire, silky; petals white, yellowish at base, somewhat cordate; peduncles very short, hairy. July. *fr.* roundish. *l.* pendent; leaflets oblong-elliptic, doubly serrated, shining above, hairy beneath; petioles glandular-hairy, somewhat prickly; stipules fringed. Branches slender, silky-hairy; prickles stipular, in pairs. *h.* 3ft. Siberia.

R. lucida (clear).* *fl.* red; calyx lobes glandular-bristly; peduncles one to three-flowered. May to July. *fr.* depressed-globular, smooth when ripe. *l.*, leaflets five to nine, elliptic or oblong-lanceolate, shining above, sharply serrated. Stems 1ft. to 2ft. high, armed with unequal, bristly prickles, which are mostly deciduous, the stouter, persistent ones nearly straight, slender. North America, 1724.

R. l. flore-pleno (double-flowered).* A charming variety, with double flowers, met with in nursery catalogues under the name of "Rose Button."

R. lutea (yellow).* Austrian Briar. *fl.* yellow, few, 2in. to 2½in. in diameter; calyx tube hemispherical or globose, glabrous, unarmed or prickly; sepals long-acuminate, entire or with marginal laciniæ; petals obcordate. June. *l.* 1½in. to 3in. long; leaflets two to four pairs, petiolulate, elliptic-ovate or orbicular, obtuse or apiculate, deeply or doubly glandular-serrate; petioles glandular-pubescent; stipules broad. Branches with straight prickles, erect. *h.* 3ft. Orient. (B. M. 363, under name of *R. l. unicolor*.) SYN. *R. Eglanteria*.

R. l. punicea (scarlet). *fl.*, petals scarlet above, and yellow beneath; stigmas purple. (B. M. 1077, under name of *R. l. bicolor*.)

R. lutescens (yellowish). A synonym of *R. hispida*.

R. macrophylla (large-leaved). *fl.* bright red, solitary or corymbose, 1in. to 3½in. in diameter; calyx tube ½in. to 1½in. long; sepals 1in. to 2in. long, persistent; petals broadly obcordate; peduncles, pedicels, and calyx usually very bristly and glandular. June. *fr.* sometimes 2in. long. *l.* 2in. to 8in. long; leaflets elliptic-ovate, acuminate or acute, finely serrated, usually pubescent beneath; petioles pubescent; stipules large, sheathing. Prickles straight or slightly curved, or absent. *h.* 6ft. Temperate Himalaya and China.

R. micrantha (small-flowered). *fl.* pale red, 1in. in diameter; sepals deciduous, densely glandular, with a leafy point and one or two leaflets. June. *fr.* scarlet, urceolate. *l.*, leaflets small, more pointed than those of *R. rubiginosa*, glabrous above, densely glandular beneath. Branches long, arched; prickles equal. *h.* 4ft. Europe (Britain).

R. microcarpa (small-fruited). *fl.* white, small, very numerous, corymbose; bracts deciduous; stalks smooth. July. *fr.* scarlet, the size and form of those of *Cratægus Oxyacantha*. *l.* distant; leaflets three or five, oblong or ovate-lanceolate, naked, simply crenate-serrate, dark shining green above, paler beneath; petioles downy or naked; stipules subulate. Branches slender, flagelliform, with a few hooked prickles. *h.* 10ft. China, 1822. Climber. (B. M. 6548; L. R. 18.)

R. microphylla (small-leaved). *fl.* of a delicate blush-colour, small. August to October. *fr.* prickly, green or yellowish when ripe. *l.*, leaflets ovate, small; bracts appressed, pectinate. *h.* 2ft. to 4ft. China. (B. M. 6549.) This species connects the

Rosa—*continued.*

Bracteateæ and the *Cinnamomeæ*. There is a double-flowered form in cultivation.

R. mollis (soft). *fl.* red; sepals persistent, densely glandular. June and July. *fr.* globose or turbinate, densely prickly, rarely naked, ripening early. *l.*, leaflets very hairy, doubly serrate. Branches erect; prickles uniform, scattered, slender, nearly straight. North Europe (Britain). Allied to *R. spinosissima*. SYN. *R. mollissima* (Sy. En. B. 466).

R. m. pomifera (Apple-bearing).* *fl.*, sepals copiously pinnate, quite persistent; petals often ciliated and glandular. *fr.* more or less pear-shaped, scarlet, large, very handsome, ripening early in autumn. Branches arching. (G. C. n. s., XXV. 237, under name of *R. pomifera*.)

R. mollissima (very soft). A synonym of *R. mollis*.

R. montana (mountain-loving). *fl.* varying from whitish to rose, generally solitary on short, erect peduncles. Summer. *fr.* deep red, globular or oblong, glandular-prickly. *l.* doubly dentate, with five to seven rounded leaflets, glabrous above, hairy beneath. Prickles scattered, nearly straight, thin. *h.* 6ft. South Europe, &c.

R. moschata (musky).* *fl.* yellowish-white, 1½in. to 2in. in diameter, very numerous, in compound corymbs; calyx tube small, obovoid; sepals ½in. long, often pinnatifid; petals orbicular-obovate; inflorescence pubescent. August. *fr.* dark brown, ⅓in. in diameter. *l.* 2in. to 6in. long; leaflets two to four pairs, ovate or ovate-lanceolate, acute or acuminate, with very numerous and acute serratures, puberulous beneath. Prickles scattered, stout, recurved. *h.* 12ft. South Europe to India, 1590. Climber. (B. R. 829, 861.) SYN. *R. Brunonii* (B. M. 4030; F. d. S. 366-7).

R. multiflora (many-flowered).* *fl.* white, pink, or purple, corymbose, often very numerous; sepals short, ovate, entire, not persistent. June. *fr.* bright red. *l.*, leaflets five to seven, ovate-lanceolate, soft, slightly wrinkled; stipules pectinate. Branches, as well as the peduncles and calyx, tomentose; prickles slender, scattered. *h.* 12ft. China and Japan, 1822.

R. m. carnea (flesh-coloured). *fl.* pink, double. (B. M. 1059; B. R. 425.)

FIG. 392. FLOWERING BRANCHLET OF ROSA MULTIFLORA FLORE-PLENO.

R. m. flore-pleno (double-flowered). This only differs from the type in having the flowers double. See Fig. 392.

R. m. platyphylla (broad-leaved). *fl.* purple, large, double. *l.*, leaflets broader than in the type. (B. R. 1372.)

R. nitida (shining).* *fl.* of a brilliant red, on bristly stalks; sepals very narrow; petals obcordate, concave, nearly erect; cymes one or few-flowered. July. *fr.* bright scarlet, depressed-spherical, somewhat hispid. *l.* very shining dark green, changing to purple in autumn; leaflets three to seven, narrow-lanceolate, naked, simply serrated; petioles slender, naked; stipules gland-fringed. Branches erect, much divided, covered all over with prickles and bristles. *h.* 2ft. North America, 1807. (L. R. 2.)

R. nutkana (Nootka Sound). *fl.* varying from pale to bright red; calyx segments entire, long-acuminate, glandular without, spathulate at apex; peduncles solitary, glabrous. June. *fr.* ovate, glabrous. *l.*, leaflets ovate-elliptic, obtuse, obsoletely glandular-serrated, pubescent at the midrib below; petioles prickly. Branches glabrous; prickles stipular. *h.* 6ft. Nootka Sound.

R. orientalis (Eastern). *fl.* solitary, shortly pedunculate; sepals straight, undivided or pinnatifid. June. *fr.* spherical or ovate, densely bristly, rarely glabrous. *l.*, leaflets five to seven, nearly

Rosa—*continued.*

round or elliptic-ovate, almost simply serrated, greyish-tomentose on both sides. Prickles all subulate, nearly straight, unequal. Orient. A dwarf species.

R. phœnicia (Phœnician). *fl.* white, disposed in a compound, corymbose panicle; calyx tube highly glabrous; sepals undivided or minutely lobulate; petals longer than the calyx. June. *l.*, leaflets three or five, ovate-elliptic, obtuse, deeply and simply serrated, opaque above, hairy or pilose and paler beneath. Branches elongated, climbing; prickles scattered, hooked. Orient.

R. pimpinellifolia (Pimpernel-leaved). A synonym of *R. spinosissima.*

R. pisocarpa (Pea-fruited). *fl.* 1in. in diameter, solitary or in few-flowered corymbs; calyx glandular, with very long lobes; petals rose-coloured, orbicular, bifid; stamens very numerous. July. *fr.* bright red, globose, erect, ½in. to ¾in. in diameter. *l.* 2in. to 3in. long; leaflets four to seven, ¾in. long, broadly elliptic, obtuse, finely serrated; petiole and rachis minutely pubescent. California, 1877. A straggling, much-branched, unarmed or spiny bush. (B. M. 6857; G. M., Oct. 9, 1886.)

R. repens (creeping). *fl.* white, with a yellow eye, one to six, rarely solitary, scentless; calyx purple; sepals deciduous, naked at back, short, broad. June and July. *fr.* small, naked, subglobose. *l.*, leaflets quite glabrous, glaucous beneath. Branches trailing, purple, glaucous; prickles uniform, stout, strongly hooked, often very large. *h.* 2ft. to 8ft. Europe (Britain). SYN. *R. arvensis. R. bibracteata* is a variety with larger leaflets and stronger shoots.

R. r. capreolata (tendrilled). Ayrshire Rose. *fl.* on glandular-hispid or rugose peduncles. *l.*, leaflets ovate, argutely serrated, slender. Prickles slender, very acute.

R. rubella (reddish). *fl.* pale or deep red, solitary, without bracts; sepals erect, entire, rough; petals concave, emarginate; peduncles hispid. June. *fr.* scarlet, pendulous, long-ovate. *l.*, leaflets seven to eleven, almost flat, oval, pointed, simply serrated or nearly so, dark green above, paler beneath; petioles sparingly glandular, without hairs; stipules dilated towards their ends. Branches erect, reddish, 3ft. to 4ft. high, bristly and prickly. Europe. This and its varieties, *gentilis, reversa,* and *stricta,* are probably hybrids between *R. alpina* and *R. spinosissima.*

R. rubiginosa (rusty-leaved).* Eglantine; Sweetbriar. *fl.* pink, one to three; sepals densely glandular, pinnate, sub-persistent. June. *fr.* globose. *l.*, leaflets glabrous above, pubescent beneath. Branches compact; prickles with a few bristles and glandular hairs intermixed. *h.* 5ft. Europe (Britain). Plant very sweet-scented. SYN. *R. Eglanteria. R. permixta* and *R. sylvicola* are mere varieties of this species.

R. rubrifolia (red-leaved). *fl.* deep red, small; sepals very narrow, longer than the petals. August. *fr.* oblong, with very tender flesh. *l.*, leaflets ovate, toothed, tinged with red, very glaucous, wrinkled, opaque. Stems deep red or purple, covered with pale bloom and armed with small, short, pale, hooked prickles. *h.* 6ft. Europe. Otherwise like *R. canina.*

R. r. fenestralis (fenestrate). A synonym of *R. setigera.*

R. r. lævis (smooth). *fl.*, sepals entire. *fr.* corymbose, and, as well as the peduncles, smooth. (B. R. 430, under name of *R. rubrifolia.*)

R. rugosa (wrinkled).* *fl.* red, large, solitary, bractless; sepals reflexed, hairy, entire, very narrow; petals emarginate; peduncles beset with straight, short, scattered prickles. June. *fr.* varying from orange-red to deep red, very large and showy, depressed-globose, pendulous, crowned by persistent, erect sepals; ripening in autumn. *l.*, leaflets five to nine, ovate, much wrinkled, simply serrated, obtuse. Branches slender, armed with very dense, straight, nearly equal prickles. *h.* 4ft. Japan, 1845. (L. R. 19.) SYN. *R. ferox* (B. R. 420). *R. Iwara* is supposed to be a hybrid between this and *R. multiflora.*

R. r. kamtschatica (Kamtschatkan). *fl.*, petals obcordate, sometimes apiculate; bracts elliptical, nearly naked. *l.* grey; leaflets obovate, blunt, with callous teeth. Branches downy, pale brown, procumbent. Prickles under the stipules large and spreading, two or three together; intermediate ones much smaller.

R. r. nitens (shining). *l.* pale shining green, highly glabrous on both sides. (B. R. 824, under name of *R. kamtschatica nitens.*)

R. sempervirens (evergreen).* *fl.* white, fragrant, very numerous; sepals nearly simple; peduncles usually glandular-hispid. June to August. *fr.* orange, small, usually glandular-hispid. *l.* persistent; leaflets ovate-lanceolate, simply serrated, smooth on both surfaces, paler beneath. South Europe and India, 1529. Climber. (B. R. 459.) The following are varieties:

R. s. Leschenaultiana (Leschenault's). *fl.*, peduncles beset with glandular bristles. *l.*, leaflets ovate-lanceolate; petioles and stems prickly, pruinose and violaceous. Stems climbing 60ft. to 70ft.

R. s. prostrata (prostrate). *fl.* white or pale red, solitary or numerous; peduncles sometimes furnished with two or many bracts. Stems prostrate.

R. s. scandens (climbing). Peduncles and fruit slightly hispid.

R. sepium (hedge). *fl.* pink; sepals sub-persistent; styles pubescent; peduncles naked. June. *fr.* ovoid, naked. *l.*, leaflets

Rosa—*continued.*

small, narrowed to both ends, glabrous, but densely glandular beneath. Prickles with a few bristles and glandular hairs intermixed. *h.* 3ft. Europe (Britain). Plant looser in habit than *R. rubiginosa,* which it somewhat resembles.

R. sericea (silky). *fl.* white, rarely pink or pale straw-coloured, solitary, ebracteate, 2in. to 2½in. in diameter, almost axillary; calyx tube and peduncles bristly and glandular; sepals pubescent, persistent; petals obcordate, usually four. May. *l.* 1in. to 3in. long, crowded; leaflets seven to nine, usually oblong, obtuse, acutely toothed, silky beneath. Branches perfectly glabrous and unarmed or prickly only, or also loosely or densely bristly and glandular. India, 1822. Plant erect or sub-scandent. (B. M. 5200; L. R. 12.)

R. setigera (bristle-bearing). Climbing or Prairie Rose. *fl.* deep rose-coloured, changing to white, corymbose; calyx and peduncles glandular. July. *fr.* globular. *l.*, leaflets three to five, ovate, acute, sharply serrated, smooth or downy beneath. Stems climbing, armed with stout, nearly straight prickles, not bristly; strong shoots growing 10ft. to 20ft. in a season. North America. Climber. SYN. *R. rubrifolia fenestralis* (L. R. 15).

R. simplicifolia (simple-leaved). *fl.* sweet-scented, solitary, without bracts; calyx tube downy, covered with needle-shaped prickles; sepals entire; petals deep yellow, with a dark crimson spot at their base. June. *fr.* pale green, depressed-globose. *l.* sessile, erect, simple, narrow-obovate, densely pubescent; stipules absent. Branches slender, pubescent, bristly; prickles slender, falcate. *h.* 2ft. to 3ft. Siberia and Persia, 1790. (G. C. n. s., xxiv. 468.) SYNS. *R. berberifolia, Hultheimia berberifolia, Lowea berberifolia* (B. R. 1261). *R. Hardii* (G. C. n. s., xxiv. 469) is a hybrid between this species and *R. involucrata.*

R. sinica (Chinese).* Cherokee Rose. *fl.* white, large, solitary; calyx very bristly; sepals rigid, spreading. June. *fr.* orange-red, muricate. *l.* evergreen, mostly trifoliolate; leaflets smooth and shining, hispid on the midrib. Stem long, trailing, smooth, the branches armed with very stout, curved prickles. China (naturalised in Southern United States, West Indian Islands, &c.), 1759. (B. M. 2847; B. R. 1922; L. R. 16.) SYN. *R. lævigata.*

R. s. hystrix (bristly). *fr.* purple, very brittle. *l.* distant. Branches covered with little, short, stiff bristles, a few large, falcate prickles being mixed among them. (L. R. 17, under name of *R. hystrix.*)

R. spinosissima (very spiny).* Burnet or Scotch Rose. *fl.* white or pink, 1in. to 1½in. in diameter, one to three or more together; calyx tube usually glabrous; sepals simple, more or less persistent. May and June. *fr.* short. *l.* small, slightly or not glandular; leaflets seven to nine, singly or doubly serrated, usually broad. Prickles crowded, very unequal, nearly straight, passing into stiff bristles and glandular hairs. *h.* 1ft. to 4ft. Europe (Britain), Siberia. (Sy. En. B. 461.) SYN. *R. pimpinellifolia.*

R. s. altaica (Altaic). *fl.*, calyx and peduncles smooth. *l.* broader than in the type. Plant taller. (B. R. 888, under name of *R. grandiflora.*)

R. s. argentea (silvery). *fl.* white, semi-double; calyx and peduncles purple, hispidulous. *l.*, leaflets ovate, white-tomentose beneath. Stems and branches hispid, prickly, intermixed with minute bristles. (B. M. 1570, under name of *R. hispida argentea.*)

R. s. myriacantha (many-spined). *fl.*, calyx and peduncles hispid. *l.*, leaflets minute, doubly-serrated. Prickles very numerous, the lower ones often reversed. (L. R. 10, under name of *R. myriacantha.*)

R. s. reversa (reversed). *fl.* yellowish-white. Stems clothed below with very slender, deflexed prickles. (B. M. 431.)

R. stylosa (large-styled). *fl.*, sepals reflexed, much pinnate; styles as long as, or shorter than, the stamens; peduncles elongated, more or less bristly and glandular. *l.*, leaflets pubescent beneath. A tall, rarely low bush. To this species, which is intermediate between *R. canina* and *R. repens,* the following varieties are referred: *fastigiata, gallicoides, Monsoniæ, opaca, systyla.*

R. sulphurea (sulphur-coloured). A synonym of *R. hemisphærica.*

R. tomentosa (tomentose). *fl.* bright rose-pink, sometimes pure white, generally one to three; calyx tube prickly or naked; sepals copiously pinnate, not quite persistent. June and July. *fr.* ovate-urceolate or sometimes turbinate. *l.* 4in. to 5in. long; leaflets copiously duplicate-serrate (rarely simply-serrate), thinly grey-downy above, more so below. Branches elongated, arching; prickles scattered, equal, straight or nearly so, slender. *h.* 6ft. Europe (Britain). (Sy. En. B. 467.) Of this species there are numerous varieties.

R. turbinata (top-shaped). *fl.* reddish-violet, ample, sub-corymbose; calyx turbinate, nearly smooth; sepals undivided, sub-spathulate; peduncles rugulose-hispid. June. *l.*, leaflets five to seven, ovate-cordate, bullate-wrinkled, ample, simply serrated, approximate, slightly villous beneath; stipules large, amplexicaul. Stems almost unarmed; branches smooth. *h.* 5ft. 1629. Of garden origin: perhaps a hybrid between *R. canina* and *R. gallica.*

R. Webbiana (Webb's). *fl.* pink, 1in. to 3in. in diameter, usually solitary; calyx often densely bristly, sometimes quite

Rosa—*continued.*

smooth; sepals persistent, caudate-acuminate, exceeding the obcordate petals. June. *fr.* ovoid or globose, ½in. to 1in. in diameter. *l.* ½in. to 2in. long; leaflets two to five pairs, oblong or orbicular, rarely obovate, entire towards the usually rounded base; stipules small. Prickles copious, erect, straight or curved. *h.* 2ft. to 5ft. Inner Himalaya.

R. Woodsii (Woods'). A synonym of *R. blanda.*

VARIETIES. These are almost innumerable, particularly in the Hybrid Perpetual class, which is so well known and so justly popular with all cultivators, either for exhibition purposes, culture in pots, or for garden decoration, &c. The beautiful varieties of Tea, Hybrid Tea, and Noisette Roses are best adapted for culture under glass, where their extremely delicate flowers are unsurpassed; if placed in the open air, the plants require a warm position, and protection in winter. The other classes referred to below are mostly what are known as Garden Roses, because they are not generally used for exhibition, but for climbing and for other decorative garden purposes.

Hybrid Perpetual Roses.

The subjoined selection of varieties from this class, although somewhat long, contains only a portion of such as are alike worthy of being included, but which have necessarily to be omitted. They are nearly all of vigorous-growing habit under liberal treatment, therefore no reference is made on this point to each individually.

ABEL CARRIÈRE, maroon, shaded scarlet; large, full, good form. ABEL GRAND, silvery-rose, glossy and clear; very sweet-scented. ALFRED COLOMB, bright fiery-red; large, full, and of fine globular form; fragrant and superb. ALFRED K. WILLIAMS, carmine-red; large, full, and perfect form; grand exhibition flower. ANNIE LAXTON, beautiful rose-colour; large, full, and good form. AUGUSTE RIGOTARD, cherry-red; large, full, fine foliage; free-flowering. BARONESS ROTHSCHILD, delicate pink, suffused with white; very large and fine, but scentless. BEAUTY OF WALTHAM, bright rosy-crimson; medium size, full, fragrant. CAMILLE BERNARDIN, beautiful pale crimson, with lilac shade; large, full, and fine form, very sweet; superb. CAPTAIN CHRISTY, very soft flesh-colour, deeper centre; very large; fine in autumn. CENTIFOLIA ROSEA, bright rose; large but rather thin, having the scent of the Cabbage Rose. CHARLES DARWIN, deep crimson, with brownish tint, and slightly shaded with violet; a good autumnal blossomer, and thoroughly distinct. COMTESSE DE SERENYE, delicate rose, large; best in dry seasons. COUNTESS OF OXFORD, bright carmine, shaded purple; very large and full; a reliable variety. COUNTESS OF ROSEBERY, carmine-rose; smooth, beautifully cupped; free-flowering. DEVIENNE LAMY, carmine-red; large, full, and fine, globular form. DR. ANDRY, brilliant red; large and full, good form. DUCHESSE DE CAYLUS, brilliant carmine-red; a large, fine flower of great substance, perfect form; thorough perpetual. DUCHESSE DE VALLOMBROSA, soft rose, with bright pink centre, passing to rosy-white; large, full. DUCHESS OF BEDFORD, rich velvety-crimson, suffused with scarlet; petals reflexed. DUCHESS OF CONNAUGHT (Noble), bright crimson, shaded with brownish-crimson; medium size, globular. DUKE OF EDINBURGH, fine vermilion; large, full, and good form; superb. DUKE OF TECK, crimson-scarlet; large, full, and good form; very free-flowering. DUKE OF WELLINGTON, bright crimson; medium size, full, and perfect form. DUPUY JAMAIN, bright cerise, large; fine in autumn. EDOUARD MORREN, deep rose; large, and very double. ETIENNE LEVET, carmine; large, full, and exquisitely formed; a good show flower. FISHER HOLMES, deep rich crimson; full and good form. FRANÇOIS MICHELON, beautiful rich rose; reverse of petals silvery; large, full, and of fine form. GÉNÉRAL JACQUEMINOT, brilliant crimson-scarlet; an abundant blossomer and very fragrant. HARRISON WEIR, rich velvety-crimson, enlivened with scarlet; large, full, and stout in texture; fragrant. HEINRICH SCHULTHEIS, delicate pinkish-rose; large, full, and fine form, very sweet-scented; a thorough perpetual. HENRY BENNETT, fiery-red, shaded carmine; large and good form, very showy. HER MAJESTY (Bennett), rich delicate rose, similar in shade to BARONESS ROTHSCHILD; the flowers are fully 6in. across, and of great substance; an extremely large and fine new variety. HORACE VERNET, velvety-crimson, shaded with purple; extra fine. JEAN LIABAUD, velvety-crimson, shaded black, very large; a fine dark Rose. JOHN HOPPER, deep rose; back of petals lilac tint; very large and double, good form. JOHN STUART MILL, bright clear red; large, full, and beautiful form; a good variety for general cultivation. JULES MARGOTTIN, bright rose; large and full. LA FRANCE, silvery-white, back of petals rose; an abundant blossomer and highly fragrant; superb. LORD MACAULAY, bright velvety-crimson; medium size, full, and good form. LOUIS VAN HOUTTE, reddish-scarlet and amaranth, shaded with bluish-purple; large, full; a grand dark Rose. MADAME

Rosa—*continued.*

GABRIEL LUIZET, pale pink; large, full, finely cupped, fragrant. MADAME LACHARME, white, the centre sometimes shaded with light rose in opening, large; good habit, free-flowering. MADAME NAUCHURY, fine satin-like rose, with a soft lavender shade. MADAME VICTOR VERDIER, brilliant cherry-red; large and finely cupped; extra fine. MAGNA CHARTA, bright pink, suffused with carmine; large and full. MARGUERITE DE ST. AMAND, pale pink; large, full, and fine form; superb. MARIE BAUMANN, vivid red; large, full, and fragrant; superb. MARIE RADY, deep red; very large, full, and imbricated. MARQUISE DE CASTELLANE, beautiful bright rose, very large; a fine, bold flower. MAURICE BERNARDIN, beautiful rich crimson, shaded with violet; large, double, fragrant. MDLLE. THÉRÈSE LEVET, delicate pink. MERVEILLE DE LYON, white, with a slight tinge of satiny-rose; large, and of excellent form; a superb variety; extra fine. MONSIEUR BONCENNE, blackish-velvety-purple; large, full, and good form. MONSIEUR E. Y. TEAS, deep cherry-red; large and full, very fragrant; superb. MRS. HARRY TURNER, dazzling crimson-scarlet, with rich maroon shading. MRS. JOWITT, brilliant crimson, shaded with lake; flowers very large and double. OXONIAN, beautiful shaded rose, of good substance; very sweet. PAUL NERON, deep rose, exceedingly large and full; good habit. PIERRE NOTTING, blackish-red, slightly purpled; very large, of exquisite form, very fragrant. PRINCE ARTHUR, rich scarlet, shaded crimson; large, nearly full, good form; an abundant blossomer. PRINCE CAMILLE DE ROHAN, velvety-crimson-maroon, shaded with blood-red; large, and full; very fine. PRINCESS BEATRICE, rosy-pink; large, full, and fine globular form. QUEEN OF QUEENS, pink, with blush edges in summer, altogether pink in autumn; large, full, and double; free-flowering. REYNOLDS HOLE, deep maroon, flushed over with scarlet, distinct, large; a fine dark Rose. SENATEUR VAISSE, scarlet-crimson; beautiful shape, large, free-flowering, and highly fragrant. STAR OF WALTHAM, rosy-crimson, very rich and effective; large, full, and good form. SULTAN OF ZANZIBAR, blackish-maroon, edged with scarlet, medium size; a bright dark variety. ULRICH BRUNNER, lively carmine-rose; large, nearly full; very showy and good. VICTOR VERDIER, rose, shaded with carmine; full. XAVIER OLIBO, dark velvety-crimson; large and full; one of the finest dark Roses.

Tea-Scented Roses.

ADAM, pale blush-rose, large and double; fine. ALINE SISLEY, purple-rose, good form; free. ANNA OLLIVIER, rosy-flesh; base of petals darker; full, and good form. BELLE LYONNAISE, pale lemon; large, full, and fine form; a seedling from GLOIRE DE DIJON, quite distinct in colour. CATHERINE MERMET, fine fleshy-rose; large, full and perfect, imbricated; superb. COMTESSE DE NADAILLAC, bright rosy-flesh; base of petals coppery-yellow; distinct. DEVONIENSIS, creamy-white, large and full; a fine old Rose. DEVONIENSIS, CLIMBING, flowers same as old variety; of very vigorous habit. DUCHESS OF EDINBURGH, deep glowing crimson; large and full. ETOILE DE LYON, deep yellow; large and very double, full. GLOIRE DE DIJON, fawn, shaded with salmon; very large, good form; a splendid and well-known Rose for all purposes, blossoms well late in the season. GOUBAULT, bright rose, deeper centre. HOMER, blush, edged with deep rose. INNOCENTE PIROLA, creamy-white, exquisite form; very free. ISABELLA SPRUNT, sulphur-yellow, medium size; an abundant blossomer, beautiful in bud. JEAN DUCHER, salmon-yellow, centre peach; large, full, and good form. JEAN PERNET, bright yellow, medium size. LA BOULE D'OR, pale yellow, deeper centre; large and very double; does not open freely. MADAME BÉRARD, salmon-yellow; back of petals clear rose; large and full, fine form; free-flowering. MADAME BRAVY, white, centre flushed with pink; large, double, finely formed. MADAME CAMILLE, delicate salmon-pink; large, full, and fine form. MADAME DE WATTEVILLE, white, slightly shaded salmon; large, well-shaped, remarkable in colour. MADAME FALCOT, bright buff-yellow; fine. MADAME HIPPOLYTE JAMAIN, white, with yellow centre, tinted with soft rose; fine form, large and full. MADAME LAMBARD, beautiful bright red early in the season, paler in autumn; base of petals coppery-yellow; large, full, and good form; very beautiful. MADAME MARGOTTIN, beautiful citron-yellow, deeper centre, perfect form; fine. MADAME TRIFLE, salmon-yellow; outer petals sometimes deep coppery-yellow; large and full; a seedling from GLOIRE DE DIJON. MADAME WILLERMOZ, white, cream centre; very fine. MARIE DUCHER, transparent rose; very large, full, fine form; good habit. MARIE VAN HOUTTE, lemon-yellow, edged with lively rose; medium size, good form; superb. NARCISSE, sulphur-yellow, deeper centre. NIPHETOS, purest white; large and double. PERFECTION DE MONTPLAISIR, canary-yellow, medium size; free-flowering. PERLE DES JARDINS, bright orange-yellow; large, full, and good form. RUBENS, white, shaded with rose, centre peach; large and full, good form. SAFRANO, fawn-colour; beautiful in bud. SOMBREUIL, pale lemon; large and very double. SOUVENIR D'ÉLISE VARDON, flesh-white, shaded with salmon; beautiful form, large and full; tender. SOUVENIR DE MADAME PERNET, fine light rose, shaded clear yellow; very large. SOUVENIR DE M. PAUL NERON, white, delicately edged and tinted with pale rose; medium size, full. SOUVENIR D'UN AMI, deep rose; large and full, good form. SUNSET, deep orange-yellow; medium size, full; between MADAME FALCOT and PERLE DES JARDINS; superb. VICOMTESSE DE CAZES, yellow, centre coppery-yellow; a distinct and beautiful, but rather tender variety.

Rosa—*continued.*

Hybrid Tea Roses.

BEAUTY OF STAPLEFORD, pink-rose, shaded centre; large. BEDFORD BELLE, blush-white, tinted rose. CHESHUNT HYBRID, cherry-carmine, large and full; a good pillar Rose. COUNTESS OF PEMBROKE, satin-rose, highly perfumed; fine form. HON. GEORGE BANCROFT, bright rosy-crimson, shaded purple, very large. LADY MARY FITZWILLIAM, delicate flesh-colour, very large, globular; a grand variety. NANCY LEE, soft rose, sweetly scented, buds long; very free-flowering. PEARL, flesh-white, flowers small, but of perfect form. VISCOUNTESS FALMOUTH, delicate pinkish-rose; back of petals bright pink; highly scented. VISCOUNTESS FOLKESTONE (Bennett), creamy-pink, centre deep salmon-pink; large and very fragrant; new. W. F. BENNETT, bright crimson, described as being like a crimson NIPHETOS; a valuable new variety. YE PRIMROSE DAME (Bennett), primrose-yellow, centre apricot; full, and of good form; new.

Noisette Roses.

AIMÉE VIBERT, pure white; small, full, in large clusters. CAROLINE KUSTER, pale yellow; large and globular form. CELINE FORESTIER, yellow, with a deep yellow centre, of medium size; free-flowering; opens well out-of-doors. CLOTH OF GOLD, deep yellow, sulphur edges, large and fine; a shy blossomer, requiring a warm south wall. JAUNE DESPREZ, buff yellow; of robust habit. LAMARQUE, white, lemon centre; a first-class Rose for any purpose. MARÉCHAL NIEL, beautiful deep yellow; very large, full and globular form, very sweet-scented; undoubtedly one of the finest yellow Roses ever introduced. OPHIRIE, coppery-yellow, medium size, full; a fine climbing Rose. RÊVE D'OR, deep yellow, medium size; makes a good pillar or climbing Rose. SOLFATERRE, bright sulphur, large and full. TRIOMPHE DE RENNES, canary-colour; large, double, fine form. WILLIAM ALLEN RICHARDSON, deep orange-yellow, small, showy, and distinct; a good climbing Rose.

Provence Roses (*R. centifolia*).

CABBAGE or COMMON, rosy-pink, large and fragrant. CRESTED or CRISTATA, rose, pale edges; large and beautiful. WHITE or UNIQUE, paper-white; large and fine.

Miniature Provence or Pompon Roses (*R. centifolia pomponia*).

BURGUNDY, pale purplish-pink; very dwarf and small. DE MEAUX or POMPON, rosy-lilac, very small. SPONG, rosy-lilac, dwarf; a somewhat larger flower than DE MEAUX. WHITE BURGUNDY, white, slightly tinted; dwarf.

Moss Roses (*R. centifolia muscosa*).

BARON DE WASSENAËR, light crimson; vigorous, flowers in clusters. COMMON or OLD, pale rose, moderate, fragrant. COMTESSE DE MURINAIS, white, large and double; very free. GLOIRE DES MOUSSEUSES, rosy-blush; one of the largest. LANEII, rosy-crimson, large and double. LITTLE GEM, crimson; a miniature variety, very small and double, beautifully mossed. MADAME EDWARD ORY, rosy-carmine, vigorous. WHITE BATH, white, beautiful in bud.

French Roses (*R. gallica*).

BOULA DE NANTEUIL, crimson-purple, very large. D'AGUESSEAU, bright crimson, large. GLOIRE DE COLMAR, rich velvety-crimson, fine. KEAN, rich purple, crimson centre: vigorous. NAPOLÉON, deep rose, shaded purple; vigorous. ŒILLET PARFAIT, blush-white, striped crimson; very double.

Damask Roses (*R. damascena*).

LA VILLE DE BRUXELLES, rose, large and fine. MADAME HARDY, pure white; vigorous. MADAME ZOUTMAN, creamy-white, shaded pink, large. YORK AND LANCASTER, white and red, striped; a beautiful, old-fashioned, vigorous border Rose.

Hybrid Bourbon, Hybrid China, and Hybrid Noisette Roses (*R. indica hybrida*).

BLAIRII, No. 2, blush, with rose centre, large. CHARLES LAWSON, vivid rose, very large and double; fine. CHÉNÉDOLÉ, bright red; good for pillars. COUPE D'HÉBÉ, rich deep pink, large and double; vigorous. FULGENS, fine crimson; vigorous. MADAME PLANTIER, pure white; very vigorous and free-flowering. PAUL RICAUT, rosy-crimson; very free. PAUL VERDIER, carmine-red, vigorous. VIVID, rich crimson; fine.

Bourbon Rose.

SOUVENIR DE LA MALMAISON, blush-white, shaded flesh-colour, large and full; flowers best in autumn.

Austrian Briar Roses (*R. lutea*).

AUSTRIAN COPPER, coppery-red, single. AUSTRIAN YELLOW, yellow, single. HARRISONII, golden-yellow; very free and good. PERSIAN YELLOW, deep golden-yellow, vigorous.

Ayrshire Roses (*R. repens hybrida*).

BENNETT'S SEEDLING or THORESBYANA, pure white; vigorous; flowers in clusters. DUNDEE RAMBLER, white, tinged with pink. RUGA, pale flesh, semi-double, very fragrant. SPLENDENS or MYRRH-SCENTED, flesh-colour.

Rosa—*continued.*

Boursault Roses (*R. alpina.*)

AMADIS or CRIMSON, purplish-crimson. GRACILIS, bright pink. SPLENDENS, rosy-blush. Vigorous-growing climbing Roses.

Evergreen Roses (*R. sempervirens*).

FÉLICITÉ PERPÉTUELLE, creamy-white; flowers borne in clusters in the greatest profusion. FLORA, bright rose; full and exceedingly fine. PRINCESS MARIE, deep reddish-pink. Good pillar Roses that retain their foliage through a great part of the winter.

Banksian Roses (*R. Banksiæ*).

ALBA or WHITE, pure white, small, and very double, Violet-scented. LUTEA or YELLOW, yellow, very double. These are half-hardy, sub-evergreen Roses, that require a warm wall, and need but little pruning.

ROSACEÆ. A large natural order of erect or prostrate, very rarely climbing, sometimes sarmentose herbs, shrubs, or trees, widely distributed. Flowers usually regular and hermaphrodite; calyx free or adnate to the ovary; tube short or elongated, narrowed or widened; limb equal (or in *Chrysobalaneæ* often unequal), usually five-lobed, imbricated and persistent, rarely of four lobes or none; petals inserted below the margin of the disk, as many as the calyx lobes, rarely none, equal (or in *Chrysobalaneæ* unequal), obovate, oblong, rounded, or spathulate, usually exunguiculate, imbricated, deciduous; stamens usually indefinite, two to many-seriate, in a few species definite or reduced to one or two; filaments subulate or filiform, incurved in æstivation; anthers small, very rarely elongated; gynæcious carpels one or many, one or many-seriate. Fruit variable, superior or more or less inferior, naked or included within the persistent calyx tube; inflorescence variable. Leaves variable, simple or compound, alternate or rarely opposite, sometimes glandularly serrate; stipules two, free or adnate to the petiole, rarely absent; petioles often dilated at base, and biglandular at the apex. *Rosaceæ* is one of the most important orders from a garden standpoint. It is split up, by the authors of the "Genera Plantarum," into ten tribes—*Chrysobalaneæ*, *Neuradeæ*, *Pomeæ*, *Potentilleæ*, *Poterieæ*, *Pruneæ*, *Quillajeæ*, *Roseæ*, *Rubeæ*, and *Spiræeæ*—several of which are regarded, by some other writers, as distinct orders. The principal fruits yielded by members of this order are: Almond, Apple, Apricot, Blackberry, Cherry, Medlar, Nectarine, Peach, Pear, Plum, Quince, Raspberry, Service Berry, and Strawberry. In addition to these, many beautiful flowering plants are included in *Rosaceæ*, the Rose, of course, taking front rank. Rose-water is obtained, by distillation, from the petals of *Rosa centifolia*, *R. damascena*, *R. moschata*, &c., as is also the Attar of Roses used in perfumery, by maceration in oil of sesamum. *Chrysobalanus Icaco* furnishes the Cocoa Plum of the West Indies, *Parinarium excelsum* the Grey or Rough-skin Plum, and *P. macrophyllum* the Gingerbread Plum. The bark of *Moquilia utilis*, the Pottery-tree of the Amazons, contains such a large amount of silica, that, when powdered and mixed with clay, it is employed in making pottery by the natives of Para. The order comprises, according to Bentham and Hooker, about seventy-one genera and 1000 species; but some authors place the number of the latter as high as 1500. Characteristic genera: *Chrysobalanus*, *Cratægus*, *Potentilla*, *Pyrus*, *Rosa*, *Rubus*, *Spiræa*.

ROSACEOUS. Arranged like the five petals of a single rose. The term is sometimes used for rose-colour.

ROSANOVIA. Included under **Sinningia** (which *see*).

ROSCHERIA (no doubt commemorative, but name not explained by its author). ORD. *Palmæ*. A monotypic genus. The species is a slender, erect, stove palm, with many aërial roots. It requires cultivation similar to that recommended for **Phœnix** (which *see*).

R. melanochætes (black-spined). *fl.* in two-flowered clusters, spirally arranged on very slender branches of a compoundly

Roscheria—*continued.*

branching spadix in the axil of a leaf, with a long, compressed, glabrous peduncle. *fr.* black, elliptical, about ½in. long. *l.* pale green, 3ft. to 5ft. long, 2ft. to 3ft. broad, entire when young, becoming unequally pinnate; pinnæ 1ft. to 1½ft. long, bifid at the apex, scaly below; petioles 1½ft. to 2½ft. long, smooth, subtriquetrous, grooved down the face with a pale band; sheaths 1½ft. to 2½ft. long, with a few fine black spines rising from a compressed cushion. Stem 2in. to 3in. in diameter, with a ring of spines below each leaf-scar when young. *h.* 15ft. to 25ft. Seychelles, 1871. SYN. *Verschaffeltia melanochætes* (I. H. 1871, 54).

ROSCOEA (named after William Roscoe, 1753-1831, the famous historian, and the founder of the Liverpool Botanic Garden). ORD. *Scitamineæ*. A genus comprising half-a-dozen species of stove, perennial, Himalayan herbs, with thick, fleshy, fibrous rhizomes. Flowers purple, blue, or yellow, in a terminal, fascicled or spiked, sessile or pedunculate inflorescence; calyx long, tubular, two or three-toothed; corolla tube often elongated, shortly enlarged above; lobes three, the dorsal one erect, incurved and concave, the lateral ones spreading or recurved. Leaves narrow or sub-cordate-lanceolate; sheaths long and loose, sometimes very large. *R. purpurea*, the species known to gardeners, thrives in light turfy loam, and may be readily increased by divisions.

R. purpurea (purple-flowered). *fl.* full purple, arising from two or three elongated, sheathing bracts; upper lobe erect, fornicate, two lower ones linear-oblong, spreading; lateral ones short, connate within the upper one; lip large, deflexed, obovate, deeply bilobed at apex. *l.* sessile, lanceolate, striated, very finely acuminated. Stem slender, leafy, about 10in. long, clothed with the striated sheaths of the leaves. Roots tuberous, fasciculately clustered. 1820. (B. M. 4630; B. R. 1840, 61; H. E. F. 144; L. B. C. 1404; S. E. B. 108.)

ROSE. *See* **Rosa.**

ROSEA. Included under *Iresine*.

ROSE ACACIA. A common name for *Robinia hispida*.

ROSE, ALPINE. *See* **Rhododendron ferrugineum** and **R. hirsutum.**

ROSE APPLE. A common name for *Eugenia Jambos*.

ROSE BAY. *See* **Epilobium angustifolium.** The name is also given to *Nerium Oleander*.

ROSE BEDEGUAR. *See* **Rose Galls.**

ROSE BOX. A common name for *Cotoneaster*.

ROSE BRAND. *See* remarks on FUNGI under **Rosa.**

ROSE BUG. A name occasionally given to beetles that frequent the flowers of Roses. In England, the name usually denotes the **Rosechafer** (which *see*).

ROSE CAMPION. A common name for **Agrostemma** and **Lychnis** (which *see*).

ROSECHAFER (*Cetonia aurata*). This is one of the handsomest of English beetles, and is easily known

FIG. 393. ROSECHAFER (*Cetonia aurata*).

by its size (from ⅔in. to nearly 1in. long), and its colour, which is usually brilliant golden-green on the back, with

Rosechafer—*continued.*

wavy, white marks on the wing-cases near the tips, and three slightly raised lines on each. Sometimes, the colour is deep black above. The lower surface of the body is bright copper-coloured. The body is somewhat heavy in form (see Fig. 393). The Rosechafers take their common name from the beetles being partial to the flowers of Roses, which they injure, to some extent, by gnawing the sexual organs. Their colour has also given rise to the name Green Rosechafer. The larvæ feed on dead wood; and the beetles, when emerged from the pupæ, have usually to bore their way to the outer air. Hand-picking the beetles is the best remedy, since only in this state are they readily discovered.

ROSE, CHRISTMAS. *See* **Helleborus niger.**

ROSE ELDER. *See* **Viburnum Opulus.**

ROSE GALLS. These are the work of several species of insects, mostly *Cynipidæ* of the genus **Rhodites** (which *see*). This genus, in Europe, includes six species, entirely confined to Rose-galls; and, in North America, it includes four species almost confined to them—only one (*R. radicum*) resorting to Raspberries and Brambles as well as to the Roses, on all of which it causes large, oblong swellings on the root. The insects are, in all cases, small, the European species being from $\frac{1}{10}$in. to $\frac{1}{6}$in. long; but the species of *Cynipidæ* require an adept in their study to recognise them, as they are much alike.

FIG. 394. BEDEGUAR GALL.

1, Gall, natural size, on Twig; 2, Gall in section; 3, Larva of *Rhodites Rosæ*, natural size; 4, Front part of Larva; 5, Pupa; 6, Perfect Insect. The Figs. 4, 5, and 6 are magnified.

The Galls on Roses formed by species of *Rhodites* in Europe are as follows: 1. Smooth round Galls, like small peas, on leaflets of *Rosa canina* and of *R. rubiginosa* (the Sweetbriar), formed by *Rh. Eglanteriæ*. 2. Similar Galls on leaves of *Rosa centifolia* (the Cabbage Rose), formed by *R. centifoliæ*. 3. Round Galls, like small peas, but bearing a few long, straight spines, on leaves of several kinds of Roses, formed by *R. rosarum*. 4. Galls on leaves and branches of *Rosa canina*, formed by

Rose Galls—*continued.*

R. Mayri. 5. Irregularly formed red Galls, usually in the leaves, but often in other young parts of *Rosa spinosissima*, less often on *R. canina*; these are usually smooth, bright red, and thick-walled; and often two or more are joined together, so as to form irregular masses. 6. By far the most conspicuous Gall on Roses is that known as the Bedeguar. It may reach a size of 2in. in diameter. It varies a good deal in form, though usually rounded; but the surface is always covered with long, branched, mossy green or red hairs (see Fig. 394, 1). On cutting a Gall across (see Fig. 394, 2), the centre is found to be a mass of woody consistence, in which are numerous cells or spaces, each with a more or less distinct wall of its own. The outer cells can frequently be broken off from the mass. In each cell lives a white larva (see Fig. 394, 3), which in the cell becomes a pupa (Fig. 394, 5), and finally emerges as a four-winged fly (Fig. 394, 6), about $\frac{1}{8}$in. or $\frac{1}{6}$in. long, named *R. Rosæ*. The insects are black, with the legs mostly red-brown or dark brown; and the abdomen of the female is red-brown, with the end black. Weather-beaten fragments of the Galls often remain attached to the twigs for two or three years. A small Midge (*Cecidomyia Rosæ*) galls the leaflets of various Roses, causing them to swell and become fleshy. None of these various Galls can be regarded as really dangerous to cultivated Roses, and most of them, save those of *R. centifoliæ*, are almost confined to wild Roses. Cutting off leaves and branches, as soon as the Galls appear on them, is quite a sufficient check to prevent their undue increase in any locality.

ROSE, GUELDER. *See* **Viburnum Opulus.**

ROSE, HOLLY. A common name for *Helianthemum.*

ROSE, JAMAICA. A common name applied to *Blakea trinervis* and to *Meriania.*

ROSE, JAPANESE. A common name for *Camellia.*

ROSE, JUNO'S. A common name for *Lilium candidum.*

ROSELEAF SAWFLIES. *See* **Rose Sawflies.**

ROSE, LENTEN. A common name applied to the species of *Helleborus* which blossom during Lent.

ROSE MALLOW. A common name for various species of *Hibiscus.*

ROSEMARY (*Rosmarinus officinalis*). A well-known, hardy, evergreen shrub, grown in small quantities in almost every garden. The foliage is used for making what is called Rosemary tea, a decoction sometimes employed, amongst other purposes, for relieving headache. Rosemary may be propagated by seeds, by cuttings, and by layers. Seeds may be sown upon a warm, sunny border. Cuttings, taken in summer, about 6in. long, and dibbled in a shady border, under a hand glass, will root, and be ready for transplanting into permanent quarters the following autumn. Layering may readily be accomplished, in summer, by bringing some of the lower branches down, and pegging them beneath a little sandy soil. Rosemary succeeds best on a light, rather dry, soil and in a sheltered situation, such as the base of a low wall with a south aspect. There are three varieties, namely, the Common or Green-leaved, the Silver-striped, and the Gold-striped. The two last-named are not quite so hardy as the common variety.

ROSEMARY, WILD. *See* **Andromeda polifolia.**

ROSE OF JERICHO. A common name for *Anastatica Hierochuntina.*

ROSE PINK. *See* **Sabbatia angularis.**

ROSE, ROCK. *See* **Cistus.**

ROSE ROOT. *See* **Sedum Rhodiola.**

ROSE, SAGE. An old name for the genus *Cistus.*

ROSE SAWFLIES. Among the most hurtful of insect parasites of Rose-bushes are the Sawflies (*Tenthredinidæ*); a considerable number feed as larvæ either in Rose-twigs or upon the leaflets. Some of these, so far as is known, are confined to Roses for their food, while others feed also on a variety of other plants. The fullest information on the British species is to be found in Mr. Cameron's "Monograph of British Phytophagous Hymenoptera." Not only are the descriptions in the work clear and definite, but the figures of larvæ and insects are a most efficient help in identifications. The pith-feeding larvæ belong to only a few species. *Pœcilosoma candidatum* is one of the best known of these. It has been found near Oxford by Professor Westwood, but is rare. The perfect insect is about $\frac{1}{4}$in. long. It is black, covered with short pubescence, but certain spots on the head are clay-colour, and spots on the thorax and the edges of the abdominal rings are white. The dull white or yellowish larva bores into the pith during May and June, causing the leaves to wither. It becomes a pupa in the soil, after dropping from the branch. The dead branches should be cut off early, to destroy the larvæ in them.

The leaf-feeders on Roses among Sawflies are far more numerous than twig-feeders. Among those that devour the leaves, the most destructive species, probably, is *Eriocampa Rosæ*, a small insect, only about $\frac{1}{3}$in. to $\frac{1}{2}$in. long. It is shining black, with the knees and the feet of the front and middle legs white. The wings are smoky, darker at the base. The larvæ are known as Rose-slugs. They are sluggish in habit. The front segments are swollen a little, and humped. The colour is pale yellowish-green, with a dark line down the back; the head is orange. The larvæ feed on the upper surface of the leaflets, gnawing away the upper skin, and destroying the leaves, which turn brown. The larval stage lasts about fourteen days or three weeks, and the full-grown larvæ reach a length of about $\frac{1}{3}$in. They go underground to form their cocoons. The females lay their eggs on the midribs of the leaves, in May. This insect is plentiful both in Europe and in America, in which country it was first described, being named *Selandria Rosæ* by Harris. It is often very destructive to Rose-bushes in gardens.

Watering the plants with infusion of hellebore, or powdering them with sulphur, as is done to destroy Mildew on Roses, are remedies for these troublesome larvæ.

Blennocampa pusilla, a Sawfly a little larger than the last, is at times as hurtful; but the larvæ have the habit of turning down the sides of the leaflets, and live protected in these retreats. The leaves are sometimes much injured, and the bushes are evidently weakened by this treatment. The larvæ are short, stumpy, and green, with the head pale or brown. There are short, spiny hairs on the back. The skin of the sides of the body hangs down in folds. They become pupæ in cocoons in the soil, and in May and June Sawflies emerge of a shining black, with yellowish-white knees and feet on the front and middle legs, and grey-brown wings. This species is very common.

Emphytus cinctus is another common and hurtful species. It is a little over $\frac{1}{3}$in. long. Like the former, the Sawflies are shining black, except that in the female there is a white band nearly round the fifth segment of the abdomen; the hinder legs are partly white, the other four have the greater part of the shins and the feet reddish; the wings are clear. The eggs are laid on the lower surface of the leaflets. The larvæ feed on the edges of the leaflets, keeping the hinder part of the body curved over the latter, and, when at rest, they lie curled up in a ball on the lower surface of the leaflets. The body is stout, and tapers backwards. It is dark

Rose Sawflies—*continued.*

green above, with the sides light grey, and is sprinkled with small shining white tubercles; the legs are nearly white, and the head varies from yellow to brown. The larvæ, when full-fed, usually bore into the branches, and there become pupæ; but they form their cocoons sometimes among dead leaves and other rubbish on the soil.

E. melanarius and *E. rufocinctus* are nearly allied to the last, with similar habits, but are not so numerous as to call for a detailed description.

Cladius pectinicornis is also rather common upon Roses in gardens. The Sawflies are a little over ⅓in. in length, and are shining black, with scattered fine grey hairs, and yellowish-white knees and feet, and faintly smoky wings, paler near the tips, with the veins near the base reddish. The larvæ lie flat on the lower surface of the leaflets, which they gnaw into holes between the larger leaf-veins. They are flattened, and taper from about the middle towards each end. On each segment are three rows of warts, each of which bears a long brown hair; the head is small. The body is deep green or yellowish-green. The cocoons are spun between dead leaves. There are two broods in the year, the autumn brood passing the winter as larvæ in the cocoons.

Cladius Padi, a nearly allied insect, but only half as long, is often plentiful, and is destructive to Roses, as well as to Pear, Plum, Hawthorn, Birch, and various other trees and shrubs. Its larvæ also eat holes in the leaves. The cocoons are made in the soil. From two to four broods have been recorded in the year.

The genus *Hylotoma*, which has three-jointed antennæ, and the larvæ of which have twelve or fourteen claspers, or prolegs, includes several species that live, as larvæ, on Rose-leaves, viz., *H. enodis*, *H. gracilicornis*, *H. pagana*, *H. Rosæ*, &c. Of these, the last-named species is the most destructive, and we shall therefore describe it as a type of the genus as regards habits of larvæ. *H. Rosæ* is about ⅓in. or ⅖in. long, and is dull yellow, with black head and antennæ and thorax; all the legs are yellow, save that their bases and rings round the feet are

FIG. 395. LARVÆ OF ROSE-LEAF SAWFLY.

black. The larvæ (see Fig. 395) are bluish-green, with yellow spots along each side of the middle line, and on the sides are black spots, bearing bristles. The head is black-brown. There are two broods, the insects appearing in May and June, and again in August and September. The females lay their eggs in slits in young branches. The larvæ hatch in a few days, and crawl on to the leaflets, which they gnaw from the edge inwards. Fig. 395 shows two characteristic attitudes, that on the left being assumed if they are disturbed. They cast their skin about four times. When full-fed, they creep underground, and there spin cocoons and become pupæ.

Lyda inanita is the only other Sawfly which we shall mention specially as feeding on Rose-leaves. This

Rose Sawflies—*continued.*

insect is black, except a broad, dirty, yellow band lengthwise on the abdomen, yellow markings on head, antennæ yellow at their base, and brick-red elsewhere, and legs straw-yellow. The antennæ are twenty-one-jointed. The larvæ are yellowish-green, with broken red lines on the sides, and a black spot on each side of the first body-ring. Each larva lives in a tubular sack, formed of fragments of Rose-leaves arranged spirally. When full-fed, it leaves its sack (then as much as 2in. long), hanging to the back of a leaf, and burrows underground, there to become a pupa, from which the Sawfly emerges next year.

Remedies. Most kinds of Sawfly larvæ can be shaken off the bushes into vessels, or on to sheets, from which they can be swept up, to be destroyed; or the bushes may be sprinkled with flowers of sulphur, or watered with infusion of hellebore or of Paris green. Hand-picking is effectual only if the bushes are few, but is the best remedy for *Lyda inanita* and *Blennocampa pusilla*, which live concealed—not exposed, as do the others. It is advisable also to capture the Sawflies, either by using a sweeping-net, or shaking the insects off their favourite perches into some vessel or receptacle. This should be tried only in cloudy weather, as the insects are then quite sluggish, but take to flight readily in sunny weather. It has been found useful to grow flowering plants of Parsley among the Rose-bushes, as the insects congregate on the flowers, and can easily be taken upon them in the sweeping-net. The pupæ may be destroyed by removing and burning all loose, dead leaves, &c.; and by removing a few inches of surface-soil, in autumn, with the cocoons. In this way, both those that become pupæ in debris, and those that do so in the soil, are destroyed.

ROSE SLUG. The popular name of the destructive larvæ of **Rose Sawflies** (which *see*), but more especially employed for the slug-like larva of *Eriocampa Rosæ*.

ROSETTE MULLEIN. *See* **Ramondia pyrenaica.**

ROSE WILLOW. *See* **Salix rubra Helix.**

ROSE, WIND. A common name applied to *Papaver Rhœas* and *Rœmeria hybrida*.

ROSEWOOD-TREE. A name applied to several species of *Dalbergia*, &c.

ROSMARINUS (from *ros*, dew, and *marinus*, of the sea; referring to the habitat of the plant). ORD. *Labiatæ*. A monotypic genus. The species is a densely-branched and leafy, hardy shrub, employed in the manufacture of Hungary Water. For culture, &c., *see* **Rosemary.**

R. officinalis (officinal).* Common Rosemary; Old Man. *fl.* in short, axillary, few-flowered racemes, approximating, opposite, sub-sessile; calyx of a purplish colour, ovoid-campanulate, bilabiate; corolla white or pale bluish-purple, the tube shortly exserted, the limb bilabiate. February. *l.* sessile, linear, entire, with revolute margins, canescent beneath. *h.* 2ft. to 4ft. Mediterranean region, 1848. (S. F. G. 14.)

ROSTELLARIA (of Nees). Included under *Justicia*.

ROSTELLUM. A diminutive beak. A narrow extension of the upper edge of the stigma of certain Orchids.

ROSTRATE. Having a rostrum; terminating gradually in a long, straight, hard point; *e.g.*, the pod of a Radish.

ROSTRUM. A beak-like extension.

ROSULAR, ROSULATE. Collected in a rosette.

ROTATE. Wheel-shaped; circular and horizontally spreading, very flat; *e.g.*, a gamopetalous corolla, with a very short tube and a spreading limb.

ROTATION CROPPING. Cropping by Rotation is a term used in reference to kitchen garden management. It implies that the ground on which a certain crop is grown shall be planted in Rotation, by another crop of, as far as possible, quite a different character. This system is pretty generally believed in and practised in large gardens; in small ones, there is often neither sufficient space nor variety in the crops annually grown to give an opportunity for changing the situation for each. Where plenty of manure can be added for each crop, it is of not so much consequence, as additional nutriment will thereby be supplied to take the place of that which the preceding one will have absorbed. It is undoubtedly a good plan to adopt a system of Rotation Cropping, so far as possible, as one sort of vegetable will not, as a rule, require exactly the same constituent parts of the soil to nourish it as another which is of an entirely different nature and habit. In changing crops, it is best to avoid planting any to succeed others which belong to the same Natural Order, as, for instance, the different representatives of the extensive Brassica, or Cabbage tribe. These should be made to follow such crops as Beans, Onions, Peas, Potatoes, &c. It is invariably a good arrangement to grow Peas on land which has, during the previous year, been planted with Celery. Many other instances might be named, but they would not be generally applicable as, for various reasons, ground has to be cropped at certain times and seasons, when it is impossible to pay very much attention to planting under such a system as that indicated. Crops grown for the use of their roots should not follow one another, if it can be avoided; such, for instance, as Carrots, Parsnips, and other plants of the order *Umbelliferæ*. Onions may follow, and be followed by plants of the Brassica tribe. If similar crops have of necessity to succeed each other, the ground should be well dug or trenched and manured between the times of removing the one and planting another.

ROTHMANNIA. Included under **Gardenia** (which *see*).

ROTTBOELLIA (named in honour of C. F. Rottboell, 1727-1797, a Danish botanist). SYN. *Stegosia*. ORD. *Gramineæ*. A genus comprising about eighteen species of often tall, hispid or glabrous, stove or hardy grasses, broadly dispersed over warm regions, one being found in the Orient. Spikelets closely appressed, pedicellate, inserted in notches on alternate sides of the spike, which is simple, or very rarely twice or thrice divided at the base; glumes four; peduncles solitary or fascicled. Leaves flat. A few of the species have been introduced, but they are more curious than beautiful.

ROTUND, ROTUNDATE. Rounded in outline; usually applied to bodies which are not round themselves, but only at their ends.

ROUGE PLANT. *See* **Rivina humilis.**

ROULINIA. A synonym of **Nolina** (which *see*).

ROUPALA (said to be the native name in Guiana). Otherwise spelt by various authors *Rhopala*, *Ropala*, and *Rupala*. ORD. *Proteaceæ*. A genus of handsome stove, glabrous, or ferruginously-tomentose trees, natives of tropical America. About thirty species have been enumerated; but they are very difficult to distinguish, entire, toothed, and pinnate leaves being sometimes found on the same tree. Flowers regular, twin-pedicellate, disposed in axillary or lateral racemes; perianth cylindrical, the segments eventually becoming recurved at apex. Fruit a hard, obliquely two-valved, shortly stipitate capsule. Leaves alternate, coriaceous, rigid, entire or toothed, undivided or on the sterile branches (of young trees?) pinnate. The species best known to cultivation are described below. They thrive in a compost of peat and loam. Propagation may be effected by cuttings, inserted in sand, under a glass, with bottom heat.

Roupala—*continued.*

R. Boissieriana (Boissier's). *fl.* yellow; racemes axillary, solitary or twin, sub-sessile, 5in. to 6in. long. *l.* ovate, 3in. to 4in. long, long-acuminate, rounded at base, shortly decurrent into petioles 1in. to 1½in. long. New Grenada, 1853.

R. complicata (folded-leaved). *fl.* pale rufous, very sweet-scented, in rather loose racemes, 3in. to 5in. long. *l.* ovate, thickly coriaceous, glaucescent, 1½in. to 5in. long, 1in. to 3in. broad, entire or rarely with a few remote or obtuse teeth, attenuated-acuminate, broadly rounded at base, decurrent to petioles about 1in. long. *h.* 6ft. to 8ft. Columbia, 1853.

R. corcovadensis (Corcovado). A synonym of *R. Pohlii*.

R. elegans (elegant). *l.* impari-pinnate, 8in. to 12in. long, nine to twelve-jugate; leaflets lanceolate, acuminate, serrate, 2in. to 4in. long, with mucronulate teeth; lateral ones falcate, very unequal at base; terminal ones not larger. Branches slenderly striate. Brazil.

R. heterophylla (variable-leaved).* *fl.*, racemes axillary, solitary or twin, sub-sessile, about 3in. long. *l.* remotely obtuse-toothed, or occasionally entire at base, shining above, the nerves elevated on both surfaces. Branches twiggy, densely leafy. Brazil. (R. G. 1863, 402.)

R. media (middle). *fl.* green; racemes rufous-tomentose, longer than the leaves. May. *l.* elliptic, acute and acuminate, mostly simple, but occasionally pinnately trifoliolate, with ovate, entire leaflets. *h.* 10ft. Guiana, 1823.

R. montana (mountain). *fl.* sweet-scented, with yellow or fulvous tomentum; racemes terminal and axillary, solitary or twin, 5in. to 6in. long, sub-sessile. April. *l.* elliptic, rigid, 2in. to 3in. long, shortly acute or acuminate, nearly entire, decurrent, on slender petioles, with a few obsolete teeth. *h.* 10ft. Guiana, 1823.

R. obovata (obovate-leaved). *fr.* 1in. long, sessile, oblong, sub-falcate. *l.* obovate, very shortly acuminate, cuneate-attenuated at base, remotely toothed and here and there entire, 3in. to 6in. long, 2½in. broad; petioles 1in. long. *h.* 24ft. Popayan, 1855.

R. Pohlii (Pohl's).* *fl.* orange-red, clustered in dense, rufous-woolly racemes, which are 6in. to 12in. long, sessile and solitary in the uppermost axils. *l.* rigid, pinnatisect or entire, ovate or elliptic, acuminate at both ends, irregularly serrate, glabrous, and shining above, woolly-tomentose beneath. *h.* 6ft. to 20ft. Minas Geraes. (B. M. 6095.) SYN. *R. corcovadensis*.

ROUPELLIA (named in honour of the Roupell family, encouragers of botany). ORD. *Apocynaceæ*. A genus comprising two or three species of stove or greenhouse, glabrous, sometimes climbing, African shrubs. Flowers white or pink, showy, in terminal, dichotomous cymes; calyx of five oblong or lanceolate segments; corolla funnel-shaped, with a short tube, an ample campanulate throat, and ten processes, united in a ring below; lobes five, broad, twisted. Follicles long, hard, and thick, divaricating, connate at base. Leaves opposite, penniveined. *R. grata*, the only species introduced, is a tall, stove climber, thriving in a compost of fibry loam and peat. It may be increased by means of cuttings of the young shoots, inserted in sand, under a bell glass, in heat.

R. grata (agreeably-scented). Cream Fruit-tree. *fl.*; corolla white, tinged with pale rose-colour, very fragrant, in dense, sessile cymes; corolla segments broadly obovate; coronal processes pale rose-colour. May. *fr.* the Cream Fruit of the natives. *l.* nearly 1ft. long, shortly petiolate, oblong-elliptic, shortly acuminate, prickly at base, rather thick; petioles red, scarcely dilated at base. Sierra Leone. (B. M. 4466.)

ROUREA (name not explained; probably altered from the Indian native name of one of the Guiana species). SYNS. *Canicidia*, *Robergia* (of Schreber). ORD. *Connaraceæ*. A genus comprising about forty-two species of stove trees and shrubs; one is African, and the rest tropical American. Flowers small, in axillary, many-flowered panicles. Leaves alternate, evergreen, coriaceous, impari-pinnate. *R. frutescens*, the only species introduced, is probably lost to cultivation.

ROUSSÆACEÆ. Included under *Saxifrageæ*.

ROWAN OR ROAN-TREE. A common name for *Pyrus Aucuparia*.

ROXBURGHIA. A synonym of **Stemona** (which *see*).

ROXBURGHIACEÆ. A small natural order of twining or erect, half-shrubby plants, natives of tropical Asia and Australia, Japan, and Florida. Flowers herm-

Roxburghiaceæ—*continued.*

aphrodite, regular; perianth of four sub-equal, petaloid, biseriate, lobes or segments; stamens four, affixed at the base of the lobes or segments, or nearly hypogynous; filaments rather thick, free or connate in a ring at the base; peduncles axillary, filiform, one or loosely few-flowered, or densely many-flowered. Capsule at length two-valved. Leaves alternate or scattered, petiolate, three to many-nerved, with thick, parallel, transverse veinlets. The tuberous root of the species of *Stemona* is candied in India. *Roxburghiaceæ* comprises only about eight species, which Bentham and Hooker classify under three genera: *Croomia*, *Stemona*, and *Stichoneuron*.

ROYAL FERN. *See* **Osmunda regalis.**

ROYAL PEACOCK FLOWER. *See* **Poinciana regia.**

ROYENA (named by Linnæus, in honour of Adrian Van Royen; he and his son David were successively professors of Botany at Leyden). ORD. *Ebenaceæ*. A genus comprising thirteen species of greenhouse shrubs or trees, natives of tropical and southern extra-tropical Africa. Flowers axillary, pedunculate, solitary or rarely few in a fascicle or three to five in a cyme; calyx five, rarely four, parted or toothed; corolla urceolate or campanulate, with five, rarely four, twisted, reflexed lobes. Fruit globose, ovoid or oblong. Leaves sessile or shortly petiolate. The species possess but little beauty. Several have been introduced, but the two described below are the only representatives of the genus which call for mention here. They thrive in sandy loam. Propagation may be effected by means of cuttings, which strike freely in sand, under a bell glass.

R. lucida (clear).* African Bladder Nut or Snowdrop-tree. *fl.* white, solitary on axillary peduncles ¼in. to 1in. long; corolla five-fid. *fr.* red and fleshy when ripe, ½in. to 1in. in diameter. *l.* elliptical or somewhat ovate, usually pointed or apiculate at apex, obtuse or sub-acute, rounded or cordate or very rarely narrowed at base, ½in. to 2¼in. long, ⅓in. to 1¼in. broad, shining above, on short petioles. *h.* 5ft. to 12ft. 1690. (B. R. 1846, 40.)

R. pallens (pale). *fl.* white or yellowish; peduncles usually much longer than the flowers. June. *fr.* ½in. to 1in. in diameter, subglobose or ovoid. *l.* narrowly obovate-elliptic, obtuse or rarely acute at apex, narrowed at the base into a short petiole, silky, especially beneath, or glabrate, evergreen, ½in. to 2in. long, ⅛in. to ¾in. wide. Branches pale or cinereous, silky-pubescent or often glabrescent. *h.* 4ft. to 15ft. 1752. SYN. *R. pubescens* (B. R. 500).

R. pubescens (pubescent). A synonym of *R. pallens*.

ROYLEA (named in honour of John Forbes Royle, once superintendent of the Botanic Gardens at Saharumpur, and Professor of Materia Medica at King's College, London). ORD. *Labiatæ*. A monotypic genus. The species is an interesting, erect, much-branched, greenhouse, cinereous shrub, with obsoletely quadrangular, spreading, paniculate branches. It will thrive in any light, rich soil. Cuttings will root readily in similar soil, if a glass be placed over them.

R. elegans (elegant). *fl.*, whorls six to ten-flowered, loose; calyx over ½in. long, cano-pubescent; corolla white, much diluted with rose-colour. July. *l.* copious, petiolate, ovate, acute, loosely sub-cordate, deeply and obtusely serrated, 1in. to 1½in. long, green above, hoary beneath. *h.* 3ft. to 5ft. Himalayas, 1824.

RUBBER PLANT, EAST INDIAN. A common name for *Ficus elastica*.

RUBBER-TREE, AFRICAN. A common name for *Landolphia*.

RUBESCENT. Reddish; turning red.

RUBIA (from *ruber*, red; alluding to the dye which is extracted from the plant). Madder. ORD. *Rubiaceæ*. A genus comprising about thirty species of mostly hardy herbs, sometimes shrubby at the base, inhabiting mostly temperate regions. Flowers small or minute, in axillary and terminal cymes. Leaves in whorls of four or rarely six, very rarely opposite and stipuled, sessile or petiolate. The species are of no particular horticultural value. *P. peregrina* is a British evergreen. *R. tinctoria* is the species which furnishes the valuable dye.

RUBIACEÆ. A large and important natural order of erect, prostrate, or climbing trees, shrubs, or herbs, mostly tropical and sub-tropical. Flowers hermaphrodite, rarely unisexual, usually regular and symmetrical, variously disposed; calyx tube adnate to the ovary, the limb superior, obsoletely cup-like or tubular, entire, toothed, or lobed; corolla gamopetalous, infundibular, hypocrateriform, campanulate, or rotate, rarely urceolate or tubular, glabrous, pilose or villous within; limb equal, or very rarely unequal or bilabiate; lobes valvate in æstivation, rarely twisted or imbricated; stamens as many as the corolla lobes, very rarely fewer, inserted in the throat or tube; filaments short, elongated, or wanting, very rarely monadelphous; anthers usually two-celled. Fruit a capsule, berry, or drupe, two to ten (very rarely one) seeded. Leaves simple, opposite or whorled, entire, very rarely obtusely crenate, serrated, toothed, or pinnatifid-lobed; stipules various, persistent or deciduous, simple, or bifid or two-parted, free or connate with the petioles, or confluent in an axillary sheath, entire, toothed, or bristly, very rarely leaf-like. Among the economical products of *Rubiaceæ*, coffee and quinine take front rank; madder, a valuable dye, may also be mentioned. The order comprises about 340 genera and 4100 species, many of which are well known in gardens. Examples: *Bouvardia*, *Cinchona*, *Gardenia*, *Guettarda*, *Rondeletia*.

RUBICUND. Blushing; turning rosy-red.

RUBIGINOSE. Brownish rusty-red.

RUBUS (the Roman name, kindred with *ruber*, red). Bramble, &c. Including *Comaropsis* (in part), *Dalibarda*. ORD. *Rosaceæ*. A large genus (comprising, according to Bentham and Hooker, probably about 100 distinct species) of stove, greenhouse, or hardy, creeping herbs or generally sarmentose and prickly shrubs, broadly dispersed. Flowers white or pink, disposed in terminal and axillary panicles or corymbs; calyx explanate, with a short, rather broad, ebracteolate tube and five persistent lobes; petals five; stamens numerous, very rarely definite; filaments filiform; anthers didymous; carpels numerous, rarely few, inserted on a convex receptacle; achenes drupaceous, rarely dry. Fruit often edible. Leaves scattered, alternate, simple, lobed, three to five-foliolate, or impari-pinnate; stipules adnate to the petioles. Among the most important species of this extensive genus are the following: *R. Chamæmorus* (Cloudberry), *R. fruticosus* (Blackberry) and *R. f. cæsius* (Dewberry), *R. Idæus* (Raspberry), and *R. occidentalis* (Virginian Raspberry). A selection of the best-known species is presented below. Except where otherwise indicated, they are hardy, deciduous shrubs. They succeed in almost any good garden soil, and may be propagated by seeds, by layers, and by covering the points of the shoots with soil. *R. biflorus* is very ornamental on a wall, because of its stems, which appear as if they had been whitewashed. *R. laciniatus* is a fine, free-growing, and ornamental subject for planting in beds where it can be allowed to grow freely. Of the common Bramble (*R. fruticosus*) there are several varieties well worthy of being cultivated for their large fruits, which are handsome and good, either raw, cooked, or preserved. They are mostly of American origin, and succeed well under similar culture to the **Raspberry** (which *see*). The following are the best: EARLY HARVEST, medium-sized fruit, an immense cropper, very vigorous; KITTATINNY; LAWTON; MAMMOTH; PARSLEY-LEAVED; WILSON, JUN., one of the finest and most prolific varieties, new; WILSON'S EARLY, fruit large, early, plant very productive. The common species itself bears immense

Rubus—*continued.*

quantities of fruits in the hedgerows, which are sometimes gathered and made remunerative.

R. arcticus (Arctic). *fl.* reddish; sepals lanceolate, often shorter than the obovate, entire or emarginate petals. June. *fr.* amber-coloured, delicious. *l.* trifoliolate; leaflets rhombic-ovate or obovate, coarsely and often doubly serrated, petiolulate. Stem low, herbaceous, unarmed. Arctic regions of both hemispheres. (B. M. 132; R. G. 314.)

R. australis (Southern).* *fl.* pink or whitish, fragrant, very numerous, in branched, prickly, downy panicles, ⅓in. to ½in. in diameter. Early summer. *fr.* numerous, yellowish, juicy, austere. *l.* very variable, ovate to lanceolate, or reduced to prickly midribs, 3in. to 5in. long. Prickles scattered, recurved. New Zealand. A lofty climber, hardy against a wall or in a sheltered spot.

FIG. 396. INFLORESCENCE OF RUBUS FRUTICOSUS CÆSIUS.

R. biflorus (two-flowered).* *fl.* white, ½in. to ¾in. in diameter, one to three together on axillary, slender, drooping peduncles; calyx pubescent. May. *fr.* golden-yellow, globose, ¾in. in diameter; drupes twenty to thirty. *l.*, leaflets three or five, 1in. to 1½in. long, ovate, lobulate, doubly toothed, white and tomentose beneath, pubescent or hairy above. Stems and branches rambling, white with glaucous bloom; prickles very strong, recurved. Himalayas, 1818. (B. M. 4678.)

R. canadensis (Canadian). American Dewberry; Low Blackberry. *fl.* white, racemose, with leaf-like bracts. May. *fr.* blackish, ovate or oblong, excellent, ripening earlier than that of *R. villosus*. *l.*, leaflets three (or pedately five to seven), oval or ovate-lanceolate, mostly acute, thin, nearly smooth, sharply cut-serrated. Stems extensively trailing, slightly prickly. North America, 1811.

R. Chamæmorus (ground Mulberry).* Cloudberry. *fl.* white, 1in. in diameter; sepals unequal, villous; petals oblong. June and July. *fr.* orange-yellow, ½in. in diameter; drupes few, large. *l.* few, sub-orbicular-cordate, obtusely five to seven-lobed, 1in. to 3in. in diameter, petiolate, crenate, wrinkled. Stem 4in. to 8in. high, erect, unarmed, simple, one-flowered, herbaceous or nearly so. Europe (Britain). (Sy. En. B. 440.)

R. cratægifolius (Hawthorn-leaved). *fl.* white, axillary, solitary, or terminal, sub-racemose; sepals acuminate, mostly recurved; petals clawed, obovate-spathulate, often retuse at apex. *fr.* rich dark red. *l.* cordate, trifid, or more or less lobed or toothed. Branches, petioles, and nerves of the leaves, armed with recurved prickles. North China and Japan. (R. G. 591, 924.)

R. cuneifolius (wedge-shape-leaved). Sand Blackberry. *fl.* white; petals large; peduncles two to four-flowered. May to July. *fr.* blackish, ovate or oblong, good-flavoured, ripening in August. *l.*, leaflets three to five, cuneate-obovate, rather thick, serrated above. Stems upright, armed with stout, recurved prickles. Branchlets and under side of leaves whitish-woolly. *h.* 1ft. to 3ft. North America, 1811.

R. Dalibarda (Dalibarda). This is the correct name of the plant described in this work as *Dalibarda repens*.

R. deliciosus (delicious).* *fl.* purple; sepals ovate-oblong, with a dilated acumination, shorter than the oval petals. May. *fr.* large, and of delicious flavour. *l.* reniform-orbicular, wrinkled, slightly three to five-lobed, finely serrate-toothed; stipules persistent. Stem erect. Branches, young leaves, and calyx, tomentose-pubescent. *h.* 3ft. North America, 1870. (B. M. 6062; G. C. n. s., xv. 537.)

R. fruticosus (shrubby).* Blackberry; Common Bramble. *fl.* white or pink, in terminal racemes, the lateral branches corymbose or elongated. July to September. *fr.* black or reddish-purple. *l.* usually pinnately three to five foliolate, sub-persistent, glabrous or pubescent; leaflets on long or short petioles, obovate or rhomboid-obovate, coarsely and irregularly serrated or toothed, convex, dark green above, pale and often glaucous beneath. Stem glabrous or bristly, prickly. Europe (Britain), &c. Under this species, Mr. Baker classifies twenty-one sub-species.

R. f. cæsius (grey). Dewberry. *fl.*, sepals appressed, densely tomentose all over the back. *fr.*, drupes few, large, glaucous. *l.*, leaflets usually three, green on both surfaces. Stem prostrate, glaucous. Prickles unequal, setaceous. See Fig. 396.

R. Idæus (Mount Ida). Raspberry. *fl.* white, drooping; calyx long-tipped; cymes ½in. in diameter, few-flowered. June to August. *fr.*, drupes many, red or yellow, hoary. *l.* ovate or elliptic, acuminate, 3in. to 5in. long, acutely and irregularly serrated, white and hoary beneath. Stems 3ft. to 5ft. high, biennial, terete, prickly, pruinose. Europe (Britain). For culture, &c., *see* **Raspberry.**

R. laciniatus (torn).* *fl.* white or rose-coloured, in loose panicles; calyx segments prickly, somewhat leafy, reflexed at apex; petals three-lobed at apex. June to September. *l.*, leaflets three to five, dissected and sharply serrated, puberulous beneath. Stems nearly terete, straggling. Prickles dilated at base. (W. D. B. 69.)

R. lasiocarpus (woolly-fruited). *fl.* deep pink, small; petals orbicular or broadly obovate; corymbs small, axillary and terminal, corymbose. May. *fr.* red or orange, small, globose, hoary. *l.* 3in. to 10in. long; leaflets five to nine, ovate, elliptic, or ovate-lanceolate, 1in. to 3in. long, acutely toothed or serrated, beneath usually hoary, the terminal one above lobulate. Branches cylindric, rambling. Prickles stout, variable. Himalayas.

R. l. pauciflorus (few-flowered). *fl.* small, puberulous, crowded in corymbs. A common Himalayan form, glabrous and shining except the under surface of the leaves. (B. R. 854, under name of *R. pauciflorus*.)

R. nutans (nodding). *fl.* white, usually solitary, axillary, 1½in. broad, on stout peduncles; calyx tube villous. June. *fr.* of few scarlet drupes. *l.*, leaflets three, orbicular or sub-rhomboidal, 1½in. to 3in. long and broad, obscurely lobed, acutely and doubly toothed, the lateral ones shortly petiolulate. Stem 1ft. to 2ft. long, unarmed, from a woody rootstock. Himalayas, 1850. (B. M. 5023.)

R. nutkanus (Nootka). *fl.* white, very large; sepals long-cuspidate; peduncles rather few-flowered. August. *fr.* red. *l.* five-lobed; lobes nearly equal, broad, coarsely and unequally toothed. Stems flexuous, hirsute. *h.* varying from 1ft. to 10ft. North America, 1826. (B. M. 3453; B. R. 1368; S. B. F. G. ser. ii. 83.)

R. occidentalis (Western). Black Raspberry; Thimbleberry; Virginian Raspberry. *fl.* white; petals small, erect, shorter than the sepals. May. *fr.* purplish-black (rarely whitish), hemispherical, ripening early in July. *l.*, leaflets three, rarely five, ovate, acute, coarsely and doubly serrated, white-downy beneath, the lateral ones somewhat stalked. Stems recurved, with hooked prickles. North America, 1696.

R. odoratus (fragrant). Purple-flowering Raspberry. *fl.* purplish-rose, showy, 2in. broad; calyx lobes tipped with a long, narrow appendage; petals rounded; peduncles many-flowered. June to August. *fr.* reddish, flat and broad. *l.* three to five-lobed; lobes pointed and minutely toothed, the middle one prolonged. Stem 3ft. to 5ft. high, not prickly. North America, 1700. (B. M. 323.)

R. parvifolius (small-leaved). *fl.* red, racemose; calyx segments tomentose, ovate, short. August and September. *fr.* red, globose. *l.* trifoliolate; leaflets clothed with white tomentum beneath. Stems terete, tomentose. *h.* 1ft. to 2ft. Japan, 1818. (B. R. 496.)

R. phœnicolasius (purple-haired). *fl.* pale pink, in terminal racemes; calyx 1½in. to 2in. in diameter; petals minute, erect. Midsummer. *fr.* scarlet, ovoid-oblong, ¾in. long, of forty or more ellipsoid drupes. *l.* 5in. to 7in. long, pinnately trifoliolate or the uppermost ones simple; leaflets crenate-serrated, white-tomentose beneath. Stem tall, sub-scandent. Japan, 1877. Plant covered with stiff, gland-tipped, red-purple hairs. (B. M. 6479.)

R. reflexus (reflexed). *fl.* white, racemose, axillary; sepals ovate, bluntish, equalling the petals; racemes few-flowered, nearly sessile, reflexed. July and August. *l.* oblong-cordate, three to five-lobed, densely tomentose beneath; terminal lobe elongated. Stems unarmed, straggling. Branches terete. China, 1817. Greenhouse. (B. R. 461.)

R. rosæfolius (Rose-leaved). *fl.* white, ¾in. to 1in. in diameter, solitary or in very loose panicles. August. *fr.* orange-red, globose or oblong, of innumerable, minute, glabrous drupes. *l.*, leaflets five to seven, ovate-lanceolate, acuminate, doubly incised-serrated, 1in. to 2in. long, rarely more. Stems erect or inclined, with scattered, hooked prickles. Himalayas, 1811. Greenhouse. (F. d. S. 1714.)

R. r. coronarius (crowned). *fl.*, petals numerous, much longer than the calyx. (B. M. 1783; G. C. n. s., xi. 77; L. B. C. 158.)

R. spectabilis (showy).* Salmon Berry. *fl.* bright red, very large; sepals hairy at base, much shorter than the petals; peduncles solitary or in pairs, one or two-flowered. May. *fr.* red, ovoid, more than double the size of the common Raspberry, but inferior in flavour. *l.* nearly glabrous, trifoliolate; leaflets ovate, acuminate, membranous, somewhat pinnatifid-

Rubus—*continued.*

incised, serrated, the lateral ones distant from the terminal one, often deeply two-lobed. Stem erect, 6ft. to 10ft. high, unarmed or with deciduous prickles. North America, 1827. (B. R. 1424; L. B. C. 1602.)

R. strigosus (hairy). American Wild Red Raspberry. *fl.* white, small; petals erect, as long as the sepals. June and July. *fr.* light red, hemispherical, ripening all summer, "tenderer than the garden or European Raspberry" (Asa Gray). *l.*, leaflets three to five, oblong ovate, acute, cut-serrated, whitish-downy beneath, the lateral ones sessile. Stems biennial and woody, prickly, upright. *h.* 3ft. North America.

R. triflorus (three-flowered). Dwarf Raspberry. *fl.* white, small; sepals and petals often six or seven, the latter erect; peduncle one to three-flowered. June. *fr.* of few separate grains. *l.* three (or pedately five) foliolate; leaflets rhombic-ovate or ovate-lanceolate, acute at both ends, coarsely and doubly serrated, thin, smooth. Stems ascending, 6ft. to 12ft. high, or trailing, not prickly. North America. (H. F. B. A. i. 62.)

R. villosus (hairy). American High Blackberry. *fl.* white, racemose, numerous; sepals much shorter than the obovate-oblong petals. May and June. *fr.* blackish, large, ripening in August and September. *l.*, leaflets three (or pedately five), ovate, acute, unequally serrated, the terminal ones somewhat cordate, conspicuously stalked. Stems upright or reclining, armed with stout, curved prickles. *h.* 1ft. to 6ft. North America, 1777.

RUCKIA (of Regel). A synonym of **Rhodostachys** (which *see*).

RUDBECKIA (named in honour of Olaf Rudbec, Professor of Botany at Upsal). Cone Flower. Including *Centrocarpha*, *Dracopis*, *Helichroa*, *Lepachys*, *Obeliscaria* and *Ratibida*. ORD. *Compositæ*. A genus comprising about twenty-five species of greenhouse or hardy, slightly branched, perennial herbs, natives of North America. Flower-heads purplish, violet, or pale (sometimes with

FIG. 397. UPPER PORTION OF STEM OF RUDBECKIA PINNATA.

the ray, and rarely the disk, yellow), large or mediocre, solitary or few, on long peduncles; involucre hemispherical, the bracts in two, three, or four series; receptacle much elevated, conical or columnar; ray florets ligulate, spreading, often elongated, entire or with two or three short teeth at the apex; achenes glabrous. Leaves alternate or rarely opposite, entire, toothed, incised, or pinnatisect. The under-mentioned species are

Rudbeckia—*continued.*

all hardy, and will thrive in any ordinary garden soil. Increased by divisions, or by seeds. *R. maxima* and *R. speciosa* are two of the most attractive of hardy perennials for mixed borders and massing.

FIG. 398. UPPER PORTION OF STEM OF RUDBECKIA PURPUREA.

R. columnaris (columnar). *fl.-heads*, ray florets yellow, or sometimes yellowish-red, elongated, dependent, bidentate at apex. September. *l.* pinnatisect; segments linear-lanceolate, acute, entire, the terminal one almost equalling the rest. *h.* 3ft. 1811. (B. M. 1601.)

R. fulgida (brilliant). *fl.-heads*, ray florets orange-yellow, about twelve, equalling or exceeding the involucre; disk dark purple, the chaff nearly smooth. July. *l.* spathulate-oblong or lanceolate, partly stem-clasping, triple-nerved, the upper ones entire, mostly obtuse. *h.* 1ft. to 3ft. 1760. Plant hairy. (B. M. 1996.)

R. grandiflora (large-flowered).* *fl.-heads*, ray florets yellow 2in. long, dependent; disk dark purple, convex. September. *l.* petiolate, acute, attenuated at base, reticulate-veined; lower ones ovate, crenate-toothed; upper ones lanceolate, very scabrous, obsoletely crenate. Stem angular, branched. *h.* 3½ft. 1830. (S. B. F. G. ser. ii. 87, under name of *Centrocarpha grandiflora*.)

R. hirta (hairy). *fl.-heads* large, solitary; ray florets yellow, about fourteen, more or less exceeding the involucre; disk dull brown, the chaff hairy at the tip. June to August. *l.* nearly entire; upper ones oblong or lanceolate, sessile; lower ones spathulate, triple-nerved, sessile. Stems simple or branched near the base, 1ft. to 2ft. high. 1714. Plant very rough and bristly-hairy. (S. B. F. G. 82.)

R. maxima (greatest).* *fl.-heads* solitary, on long peduncles; ray florets pure yellow, 2in. long, drooping; disk columnar, elongated. August. *l.* large, membranous, oval or oblong, slightly toothed or entire, feather-veined, the lower ones petiolate, the upper ones clasping; lowest ones 8in. to 12in. long. Stem 4ft. to 9ft. high. A handsome plant.

R. Newmanii (Newman's). A synonym of *R. speciosa*.

R. pallida (pale). This is the correct name of the plant described in this work as *Echinacea angustifolia*.

R. pinnata (pinnate-leaved).* *fl.-heads*, ray florets light yellow, large and drooping, much longer than the oblong disk; receptacle exhaling a pleasant, anisate odour when bruised. July. *l.* alternate, pinnate; leaflets three to seven, lanceolate, acute. *h.* 3ft.

Rudbeckia—*continued.*

1803. See Fig. 397. (B. M. 2310; S. E. B. 38.) SYN. *Lepachys pinnata.*

R. purpurea (purple).* This is the correct name of the plant described in this work as *Echinacea purpurea.* See Fig. 398.

R. speciosa (showy).* *fl.-heads* 2½in. to 4in. across; ray florets orange-coloured, contrasting well with the black-purple disk. Summer. *l.*, lowest ones ovate, strongly ribbed, coarsely toothed, borne on slender stalks 6in. to 9in. long; succeeding ones gradually becoming narrower; uppermost ones sessile. Stems freely branched below. *h.* 2ft. to 3ft. A fine plant. (G. C. n. s., xvi. 373.) SYN. *R. Newmanii.*

R. triloba (three-lobed). *fl.-heads* small, but numerous and showy; ray florets eight, yellow, ¾in. long; disk blackish-purple. August. *l.*, upper ones ovate-lanceolate, sparingly toothed, the lower ones three-lobed, tapering at the base, coarsely serrate; those from the root pinnately parted or undivided. *h.* 2ft. to 5ft. 1699. Plant hairy, much-branched. (B. R. 525.)

RUDDLES. An old name for Marigolds.

RUDERAL. Growing in waste places or amongst rubbish.

RUDGEA (named in honour of Edward Rudge, an English botanist, who published in 1606 "Plantarum Guianæ Icones"). ORD. *Rubiaceæ.* A genus comprising about forty-five species of glabrous or pubescent, stove shrubs or small trees, natives of tropical America. Flowers mediocre or rather large, paniculate, sessile or pedicellate, rarely capitate; calyx tube ovoid or obconical; limb of five, rarely four, persistent segments or parts; corolla cylindrical or funnel-shaped, the tube usually straight and elongated, the throat naked or bearded, the limb of five, rarely four, erect or spreading lobes; stamens five, or rarely four. Leaves opposite, sub-sessile or petiolate, coriaceous; stipules often cartilaginous, sometimes thickly coriaceous and inflated. For culture of the species best known in gardens, *see* **Coffea.**

R. macrophylla (large-leaved). *fl.* cream-colour, sessile; fascicles densely clustered in globose heads; corolla segments obtuse; peduncles short. Summer. *l.* large, sub-sessile, obovate-oblong, narrowed at base. *h.* 6ft. Brazil, 1867. (B. M. 5653; F. d. S. 1720; G. C. n. s., xii. 81.)

RUDIMENTARY. Imperfectly developed; incomplete.

RUDOLPHIA (named after Charles Asmund Rudolph, 1771-1832, a botanist of Jena). ORD. *Leguminosæ.* A genus comprising two or three species of handsome, stove, twining herbs, confined to St. Dominga. Flowers red, elongated, fasciculate-racemose on axillary peduncles; calyx tubular, the two upper lobes connate, the lateral ones smaller; standard oblong, erect, inappendiculate; bracts and bracteoles small, narrow. Leaves one-foliolate, stipellate. The two species described below are probably not in cultivation.

R. rosea (rose-coloured). *fl.* scarlet, ½in. long, in pedunculate racemes. June. Pods pubescent. *l.*, leaflet ovate-oblong, glabrous, acuminated. Branches smooth, glabrous. 1826.

R. volubilis (twining). *fl.* scarlet, 1½in. long; racemes bearing flowers from the base. July. *l.* glabrous, cordate-ovate, acuminate. Branches dotted from tubercles. 1820.

RUDOLPHŒMERIA. A synonym of **Kniphofia** (which *see*).

RUE (*Ruta graveolens*). A hardy evergreen, somewhat shrubby plant, native of Southern Europe, cultivated in gardens for its use medicinally; the leaves emit a powerful odour, and have an exceedingly acrid taste. The plant grows almost anywhere, but thrives best in a partially sheltered and dry situation. Propagation may be effected by seeds, sown outside, in spring; and by cuttings or rooted slips, taken at the same season, and inserted for a time, until well rooted, in a shady border.

RUE, GOAT'S. *See* **Galega officinalis.**

RUELLIA (named in honour of John Ruelle, of Soissons, 1474-1537, botanist and physician to Francis I.; he published a treatise, "De Natura Plantarum," in 1536).

Ruellia—*continued.*

Including *Arrhostoxylum*, *Dipteracanthus*, and *Stephanophysum*. ORD. *Acanthaceæ.* A genus comprising about 150 species of stove or greenhouse, pubescent, villous, or rarely glabrous, annual or perennial herbs, sub-shrubs, or shrubs, mostly American, a few being found in Africa, Asia, and Australia. Flowers violet, pale lilac, white, red, or rarely yellow or orange, sessile or sub-sessile in the axils of the leaves or bracts, sometimes solitary or fascicled, sometimes in paniculate cymes; calyx deeply five-fid or five-parted; corolla tube straight, incurved, or abruptly bent, dilated upwards; limb spreading, very oblique or sub-equal, with five ovate or rounded, twisted lobes; stamens four, included or exserted. Leaves opposite, entire or rarely toothed; bracts often narrow or small. The best-known species are described below. They are pretty, free-flowering plants, and readily thrive in any light, rich soil, with stove heat. Propagation may be effected by cuttings, inserted in similar soil, under a hand glass.

R. acutangula (acute-angled). *fl.* sessile, on axillary peduncles, 4in. to 6in. long; calyx ½in. long; corolla tube 1in. long, slightly curved; limb bright orange-scarlet, yellow at the throat, 2in. in diameter. May. *l.* 5in. to 8in. long, elliptic-ovate, acuminate, narrowed into the petiole, with many nerves sunk in the surface. Branches obtusely quadrangular. Brazil. A large herb or undershrub. (B. M. 6382.)

R. Baikiei (Dr. Baikie's).* *fl.* opposite, sessile, in a terminal panicle, composed of many-flowered, opposite racemes or spikes; corolla scarlet, over 2in. long, tubular-infundibuliform, inflated or ventricose in the middle. Winter. *l.* in opposite pairs, sometimes more than 9in. long, including the petiole, ovate-lanceolate, acuminate, attenuated at base. *h.* 3ft. West Africa, 1858. Sub-shrub. (B. M. 5111, under name of *Stephanophysum Baikiei.*)

R. ciliatiflora (fringe-flowered). *fl.* purplish-blue, handsome, two to four or six in a terminal, leafless panicle; corolla 1in. across, the tube about the same length; margins of limb beautifully dentate-ciliate. September. *l.* opposite, ovate, petiolate, the margins unequally serrate, more or less hairy; lower ones more so, and the largest. Stem herbaceous, pubescent-scabrous. *h.* 2ft. Buenos Ayres, 1838. (B. M. 3718.)

R. Devosiana (Devos'). *fl.* white, axillary; corolla tube suddenly dilated and bent at the middle. *l.* lanceolate, distantly toothed, deep green above, with the course of the veins whitish, entirely purple beneath. Stems purple. Brazil, 1877. Sub-shrub. A very effective foliage plant. (B. H. 1877, 19.)

R. elegans (elegant), of Hooker. A synonym of *R. latebrosa.*

R. formosa (beautiful). *fl.* on axillary, alternate, straight peduncles, two or three times longer than the leaves; corolla fine scarlet, showy; tube 1½in. long; two upper lobes of limb conjoined half-way up. Summer. *l.* opposite, ovate, more or less pointed, rounded at the base, covered on both sides with short hairs; petioles not half as long as the leaves. *h.* 2ft. Brazil, 1808. Shrub. (B. M. 1400.)

R. Herbstii (Herbst's).* *fl.* three to five together, 3in. long; calyx red-purple, ¾in. long; corolla pale rose-purple, abruptly bent; limb of five white, patent or recurved, bilobed divisions. September. *l.* deep dull green, the upper ones of a dull pale purple beneath, 5in. to 7in. long, 1¾in. to 2in. broad, lanceolate, acuminate, obscurely sinuated, serrated. *h.* 3ft. Brazil, 1859. An erect shrub or sub-shrub. (B. M. 5156, under name of *Dipteracanthus Herbstii.*)

R. latebrosa (secret). *fl.*, corolla salver-shaped; tube white, purplish upwards, curved; limb very bright blue, of five emarginate lobes. Summer. *l.* opposite, pubescent, ovate, acuminate, coarsely serrated, tapering gradually into a footstalk nearly equalling the leaf in length; those at the tips of the branches reduced to sessile bracts. *h.* 2ft. East Indies, 1834. Annual. (B. M. 3389, under name of *R. elegans.*)

R. longifolia (long-leaved). *fl.* vermilion; corolla segments retuse. July. *l.* oblong lanceolate or oblong, attenuated at both ends, repand or repand-denticulate. *h.* 2ft. to 3ft. Brazil, 1820. A glabrous, perennial herb.

R. macrantha (large-flowered). *fl.* of a rosy-purple colour, with a light, beautifully-veined throat, trumpet-shaped, large, axillary. *l.* long-lanceolate. 1883. A handsome, decorative shrub. (R. H. 1881, p. 410.)

R. macrophylla (large-leaved).* *fl.* handsome, sub-secund, in spreading, di-trichotomous panicles; corolla bright scarlet, 2in. to 3in. long, the tube curved, broader upwards, but laterally compressed; limb large; lobes soon reflexed. Summer. *l.* opposite, petiolate, ovate, acuminate, penninerved, reticulated, the margins sinuated or indistinctly toothed, puberulous. *h.* 3ft. to 4ft. New Grenada, Mexico, &c., 1844. Plant shrubby below, herbaceous above. (B. M. 4448 and B. R. xxxii. 7, under name of *Stemonacanthus macrophyllus.*)

Ruellia—*continued.*

R. paniculata (panicle-flowered). Christmas Pride. *fl.* purple, in axillary, opposite, dichotomously divaricate cymes; corolla funnel-shaped, nearly ½in. long. August. *l.* oblong-oval, attenuated at both ends, decurrent into the petioles, hairy-pubescent or glandulose. *h.* 3ft. West Indies, 1768. Herbaceous perennial. (B. R. 585.)

R. Portellæ (Portella's).* *fl.* axillary, solitary, sessile; calyx segments nearly ½in. long, hairy; corolla bright rose-pink, hairy externally, 1½in. to 1¾in. long, with a slender tube, dilated above the middle, and a flat limb 1in. in diameter. Winter. *l.* 2in. to 3in. long, very uniform, elliptic-ovate, sub-acute, narrowed into slender petioles one-half their own length, red-purple beneath. *h.* 1ft. Brazil, 1879. A free-flowering, much-branched, erect, annual or perennial herb. (B. M. 6498.)

R. Purdieana (Purdie's). *fl.* terminal, in pairs, each remarkable for a large pair of bracts at the base; calyx small; corolla of a fine, deep crimson-lilac, with a much-elongated tube, and a limb of five waved segments. Various seasons. *l.* opposite, petiolate, ovate, acuminate, penninerved. *h.* 1ft. to 1½ft. Jamaica, 1844. A glabrous shrub or under-shrub. (B. M. 4298; P. M. B. xvi. 129.)

R. rosea (rose-coloured). *fl.* in terminal, corymbose, glandular-hairy spikes; corolla 1in. long. Summer. *l.* lanceolate, covered with canescent wool beneath, 3½in. to 7in. long, acuminate, rigid. Brazil, 1818. Shrub.

R. Schaueriana (Schauer's). *fl.* axillary, sessile; corolla with a very long, funnel-shaped, curved tube, veiny and lilac above, pale and almost white towards the base; limb of five purplish-lilac, rounded lobes. Summer. *l.* opposite, ovate, bluntly acuminate, penninerved, pale beneath. *h.* 2ft. to 3ft. Brazil, 1844. A low shrub, with the young branches herbaceous. (B. M. 4147; B. R. xxxii. 45, under name of *R. lilacina.*)

R. solitaria (solitary). *fl.* geminate, nearly sessile; corolla rather pale purplish-lilac, with a few deeper lines or streaks; tube long, funnel-shaped, the lower half white. Winter. *l.* opposite, 1½in. to 2in. long, oblong or ovate-lanceolate, short-petioled, obtusely acuminate, pale, and sometimes purplish beneath. *h.* 2ft. Brazil. Shrub or under-shrub. (B. M. 5106, under name of *Dipteracanthus calvescens.*) The plant figured under the name of *Strobilanthes lactatus*, in B. M. 4366 and F. d. S. 346, is a form with the foliage bearing a central blotch of white.

R. speciosa (showy).* *fl.* of a rich scarlet colour, axillary, solitary, sub-sessile; corolla large, funnel-shaped, 3½in., or thrice as long as the calyx. July. *l.* oval; lower ones obtuse, with a slight mucrone; upper ones acute, glabrous, slightly acute at base, petiolate. *h.* (in its native place) sometimes as much as 20ft. Brazil, 1859. Shrub, with flexuous, dependent branches. (B. M. 5414, under name of *Dipteracanthus affinis.*)

R. spectabilis (remarkable).* *fl.* purplish-blue, marked with dark veins, sessile, or nearly so, axillary in twos, large and very showy; calyx deeply cut; corolla tube funnel-shaped, curved; limb very large, with five rounded lobes. August. *l.* opposite, moderately large, nearly sessile, ovate, acuminate, attenuated at the base, ciliated on the margins, slightly pubescent above. *h.* 2ft. or more. Peru, 1849. A slightly pubescent, annual or perennial herb. (B. M. 4494, under name of *Dipteracanthus spectabilis.*)

RUE, WALL. A common name for **Asplenium Ruta-muraria** (which *see*).

RUFOUS. Pale red, mixed with brown.

RUGOSE. Covered with wrinkled lines, the intervening spaces being convex; *e.g.*, the leaves of garden Sage.

RUIZIA (named in honour of Don Hippolite Ruiz, author, in conjunction with Pavon, of "Floræ Peruvianæ et Chilensis"). ORD. *Sterculiaceæ.* A genus consisting of only three species of stove shrubs, natives of Bourbon. Calyx five-parted; petals five, unequilateral, flat, persistent; staminal cup bearing twenty to thirty fertile stamens; peduncles axillary, cymosely many-flowered. Leaves palmi-nerved, entire, lobed, or nearly dissected, tomentose beneath. Two of the species have been introduced, and are worth growing. They thrive in a compost of loam, peat, and sand. Propagated by cuttings, which will root freely, if inserted in similar soil, under a hand glass, in heat.

R. lobata (lobed-leaved). *fl.* pale reddish. May. *l.* cordate, crenated, three to five-lobed, oblong, hoary beneath, smooth above; middle lobe longest and acuminated. *h.* 6ft. 1818.

R. variabilis (variable-leaved). *fl.* pale reddish. May. *l.* of the flowering branches palmatifid, those of the sterile ones palmately parted, hoary beneath. *h.* 10ft. 1792.

RUIZIA (of Ruiz and Pavon). A synonym of **Peumus** (which *see*).

RULINGIA (dedicated to John Philip Ruling, who wrote, in 1766, an essay on the Natural Orders of Plants). ORD. *Sterculiaceæ.* A genus comprising fifteen species of greenhouse, stellate-tomentose shrubs or under-shrubs; one is a native of Madagascar, and the rest are Australian. Flowers usually white, small, cymose; calyx five-fid; petals five, broadly concave at base, ligulate above; stamens shortly connate at base; cymes axillary or opposite the leaves, rarely terminal. Leaves entire, toothed, or lobed. The species have no great beauty, the flowers not exceeding ¼in. in diameter. Those described below are from Australia, and thrive in a compost of loam, peat, and sand. Ripened cuttings will root in either sand or soil, if covered with a bell glass.

R. corylifolia (Corylus-leaved). *fl.* in dense sessile cymes, forming dense, terminal, leafy corymbs. April. *l.* broadly ovate, 2in. to 3in. long, irregularly toothed or broadly lobed, wrinkled, green and roughly pubescent above, more densely tomentose-villous or pubescent beneath. *h.* 2ft. 1824. (B. M. 3182.)

R. hermanniæfolia (Hermannia-leaved). *fl.* in shortly pedunculate cymes. April. *l.* usually narrow-oblong, ¼in. long, in luxuriant specimens often ovate-lanceolate, or with short, broad basal lobes, always obtuse, crenate, much wrinkled, white-tomentose beneath. *h.* 2ft. or more. 1818. (L. B. C. 1564, under name of *Lasiopetalum dumosum.*)

R. pannosa (cloth-leaved). *fl.*, cymes shortly pedunculate. April. *l.*, mature ones shortly petiolate, ovate-lanceolate or lanceolate, 2in. to 3in. or more long, toothed, rounded or cordate at base, scabrous-pubescent above, with impressed veins, densely velvety or hirsute beneath; on young plants they are often broader and three to five-lobed. *h.* 2ft. 1819. (B. M. 2191; A. B. R. 603, under name of *Commersonia dasyphylla.*)

R. parviflora (small-flowered). *fl.* small; cymes shortly pedunculate. April. *l.* very shortly petiolate, ovate or ovate-lanceolate, obtuse, rarely 1in. long, deeply crenate, and mostly lobed, with undulated, often crisped margins, glabrous or nearly so above, hirsute beneath. Branches prostrate or ascending, 6in. to 18in. long. 1868. A low shrub or under-shrub.

RULINGIA (of Ehrhart). A synonym of **Anacampseros** (which *see*).

RUMEX (the old Latin name used by Pliny). Dock. ORD. *Polygonaceæ.* A large genus of perennial or rarely annual herbs, sometimes sub-shrubs, rarely tall shrubs, distributed thoughout all temperate climates. About 130 species have been enumerated, but the number is estimated by some authors at less than 100. Flowers fasciculate in the nodes; fascicles axillary or disposed in terminal racemes or panicles. Leaves sometimes all radical, sometimes alternate on the stems and branches. The species are mostly worthless, and, in some cases, very troublesome, weeds. Eleven are natives of Britain, among them may be mentioned *R. Acetosa* (Sorrel), the leaves of which have been used as Spinach, and *R. Patientia* (Herb Patience).

RUMINATED. Pierced by irregular passages, as if chewed; *e.g.*, the albumen of a nutmeg.

RUNCINATE. Saw-toothed, or sharply incised, the teeth or incisions retrorse.

RUNNER. A prostrate, filiform branch or stem, rooting at its extremity or elsewhere; *e.g.*, the Strawberry.

RUNNERS, PROPAGATION BY. *See* **Propagation.**

RUPALLEYA. A synonym of **Stropholirion** (which *see*).

RUPESTRIS, RUPICOLA. Growing on rocks or in rocky places.

RUPPIA (named after H. B. Ruppius, a botanical author). ORD. *Naiadaceæ.* A genus consisting of one or more species of hardy, tufted, aquatic herbs, inhabiting the shores of temperate and tropical regions. *R. maritima* and its sub-species *rostellata* are natives of Britain; they have no horticultural value.

RUPTURE WORT. *See* **Herniaria glabra.**

RUPTURING. Bursting irregularly.

RUSCUS (the old Latin name, used by Virgil and Pliny). Butcher's Broom. ORD. *Liliaceæ*. A small genus (two or three species) of hardy plants, with erect, branched, slightly woody stems, natives of Europe and the whole Mediterranean region, from Madeira to the Caucasus. Flowers small, usually on the face of the cladode; pedicels short, articulated at the apex. Berries globose, pulpy, indehiscent. Cladodes leaf-like, alternate or scattered, ovate or ovate-lanceolate, acute or pungent-pointed, rigidly coriaceous. The species thrive in common soil, and may be propagated by root-suckers.

FIG. 399. FLOWERING BRANCHLET AND DETACHED FRUIT OF RUSCUS ACULEATUS.

R. aculeatus (prickly). Common Butcher's Broom; Pettigree or Pettigrue. *fl.* one or two, bracteate and bracteolate. February to April. *fr.* bright red, rarely yellow, ½in. in diameter. *cladodes* ½in. to 1½in. long, ovate, rigid, spinescent, twisted at the base. Stems 10in. to 2ft. high, erect. Europe (Britain), North Africa, &c. See Fig. 399. (Sy. En. B. 1516.)

R. androgynus (hermaphrodite). A synonym of *Semele androgyna*.

R. Hypophyllum (leaf-under-leaf).* Double Tongue. *fl.* five or six in an umbel, disposed in the middle of the lower cladodes. May and June. *fr.* red, ½in. to ¾in. thick. *cladodes* oblong or oblong-lanceolate, 3in. to 5in. long; upper ones alternate; lower ones opposite, ternate, or verticillate, distinctly costate. *h.* 1ft. to 1½ft. Mediterranean region, 1640. (B. M. 2049.) *R. Hypoglossum* is regarded, by Mr. Baker, as a form of this species.

R. racemosus (raceme-flowered). Alexandrian Laurel. *fl.* greenish-yellow, hermaphrodite, produced at the ends of the branches. May. *fr.* red, with a round, coriaceous, white disk at the base. *cladodes* oblong, acute, about 2in. long, rounded at base, smooth, lucid-green, alternate, sessile. *h.* 4ft. Portugal, 1739. Evergreen shrub. (W. D. B. 145.) *Danae racemosa* is the correct name of this plant.

RUSH. *See* **Juncus.** The name is also commonly applied to many species of allied and other genera.

RUSH FERN. *See* **Schizea.**

RUSH, FLOWERING. *See* **Butomus.**

RUSH LILY. *See* **Sisyrinchium.**

RUSSELIA (named in honour of Alexander Russel, M.D., F.R.S., author of a "Natural History of Aleppo," 1756). ORD. *Scrophularineæ*. A genus comprising four or five species of showy-flowered, stove, evergreen shrubs, natives of Mexico and Central America. Calyx deeply five-fid or five-parted, with closely imbricated segments; corolla scarlet, with a cylindrical tube and a sub-bilabiate, five-fid limb; stamens four; cymes dichotomous, bracteate, many-flowered or reduced to one. Leaves opposite or whorled; those on the branchlets (which are often nodding

Russelia—*continued.*

or pendulous) frequently reduced to small scales. All the species introduced are described below. They thrive in light, rich soil. Propagation may be readily effected by cuttings, inserted in similar soil, under a glass, in heat.

R. floribunda (bundle-flowered). A synonym of *R. rotundifolia*.

R. juncea (Rush-like).* *fl.* in loose, remote-flowered racemes; corolla 1in. long; peduncles elongated. July. *l.* linear, lanceolate, or ovate, small; those on the branchlets minute and scale-like. Branches twiggy, rush-like, pendulous at apex. *h.* 3ft. to 4ft. Mexico, 1833. (B. 220; B. R. 1773.)

R. multiflora (many-flowered). A synonym of *R. sarmentosa*.

R. rotundifolia (round-leaved). *fl.* like those of *R. sarmentosa*; peduncles many-flowered. June. *l.* sessile, orbicular, deeply cordate at base, the cauline ones 2in. to 4in. long and broad, reticulate-veined beneath, softly pubescent, closely sessile or semi-amplexicaul. *h.* 4ft. Mexico, 1824. SYN. *R. floribunda*.

R. sarmentosa (sarmentose).* *fl.* falsely whorled or loosely cymose; corolla more or less bearded on the throat below the lower lip; peduncles from three or four to thirty or forty-flowered, axillary and remote, or in crowded racemes. July. *l.* variable, sometimes opposite or in whorls of three or four on the same specimen, cuneate or sub-cordate at base, acuminate and acute or obtuse, serrate or crenate, glabrous or slightly hairy. *h.* 4ft. Central America, 1812. SYNS. *R. multiflora* (B. M. 1528), *R. ternifolia*.

R. ternifolia (ternate-leaved). A synonym of *R. sarmentosa*.

RUST. Under this popular name, Fungi of more than one group are included. The true Rusts, from which the name has been derived, belong to the *Uredineæ* (*see* **Puccinia**), to the forms distinguished as *Uredo*, *Cæoma*, *Trichobasis*, *Æcidium*, and *Lecythæ*, formerly considered true genera, but now regarded only as stages in the development of *Puccinia* and of allied genera. The conidia, or spores, in these forms are small, round or oval cells, thrown off from the ends of the threads of mycelium, either singly or in rows. They fall off readily, and the surfaces of the diseased plants, and of any body that is rubbed on them, becomes covered with the spores, like iron rust in colour and general appearance. They are, accordingly, known as True Rusts or as Red Rusts. *Puccinia* includes a very large number of species, some of which (*e.g.*, *P. graminis* and allies) are called Mildews when occurring on Wheat and other cereals. The more common name for the species of *Puccinia* and of *Phragmidium* is Brands; but, occasionally, they are styled Black Rusts. For an account of all these forms, *see* **Phragmidium** and **Puccinia.**

White Rusts differ much from *Uredineæ*, though by some they are associated with them, from the fact that they produce conidia, which break away from the mycelium, and which are grouped in patches, much as in some forms of *Uredineæ*. Like these also they cover bodies rubbed against them with a powdery coating of conidia; but the latter are white, not rusty-red. The White Rusts belong to the genus *Cystopus*, and are nearly related to **Peronospora** (which *see*). There are few species in the genus; and only one, *C. candidus*, is really hurtful in gardens in this country. It grows on the leaves, stems, and flowers of many of the *Cruciferæ*, causing distortions of these organs, and especially of the flowers, which become much swollen, and remain sterile. It may be found on Cabbage, Turnip, Radish, Horseradish, and many wild *Cruciferæ*, *e.g.*, Shepherd's Purse and Watercress. It is common in North America as well as in Europe. A microscopic examination of a section through one of the white spots, which are plentifully scattered over the diseased organs, shows a layer of mycelium, from which rise branches, each of which bears on its tip a beadlike row of conidia. These fall off one after the other. When they fall into water, the contents break up into five or six zoospores, like those in *Peronospora*. These bodies escape by a hole, which opens at one end of the conidium, and move about for a time in the water by means of two hairs or cilia. Afterwards, they settle down, and push out a mycelium-

Rust—*continued.*

tube, which, on any suitable part of a plant fitted for the nourishment of the Fungus, makes its way in through a stoma, and reproduces the parasite. This process goes on during the summer; but, in autumn, "resting-spores" are formed in the tissues of the host-plants, to pass the winter in a quiescent state, and to propagate the species next summer, when food can be again obtained. These resting-spores are very similar in mode of production, and in appearance, to those of *Peronospora*. On each of two threads of mycelium, lying among the tissues of the host-plant, a branch is formed. One bears a nearly globular cell, the oogonium, the contents of which shrink a little, and lie loose in the cell, forming the oosphere. The other branch ends in a thickened cell, the antheridium, much smaller than the oogonium. It lies in contact with the latter, into which some of its contents pass through a narrow tube. The oosphere is thus fertilised, and becomes the oospore or resting-spore, distinguished by the possession of a thick, brown cell wall, which bears numerous warty ridges, and is well fitted to resist the cold of winter and other unfavourable influences. In spring, the contents of the resting-spore break up to form a large number of small cells, each capable of reproducing the Fungus in a suitable host-plant. These are set free by the bursting of the cell wall of the resting-spore.

Remedies. The only remedy available is, as far as possible, to limit the multiplication of the Fungus by the removal and burning of all plants, whether weeds or cultivated species, that show it, and by not sowing *Cruciferæ* on any piece of ground for a year or two after diseased crops have been removed from it.

RUSTIC WORK. A term applied to erections or ornaments made of rough or undressed timber and other similar materials as nearly as possible in their natural state. Undoubtedly, the best examples are those that show the least mark of the workman's tools. The materials for Rustic Work are obtained from woods and forests, heaths and swamps, and vary in character and appearance, according to the locality in which they are found. As the unshapely block of stone or marble from the quarry becomes, in the hands of the sculptor or architect, a thing of beauty, so may the gnarled and knotted branch, and the decayed Pollard-tree, the slender Larch and the smooth Hazel, the Heather of the mountain and the moss of the fen, the Sedges and Reeds by the river-bank, and the exquisite cones of the Fir-tree, each and all, in the hands of one who has true taste, be manipulated into beautiful and useful adornments for our gardens. Much of the material for the work may be found on most estates, and often amongst that which is either consigned to the fire or allowed to perish where it stands. Where alterations or improvements are being made in grounds, especially on estates which are being cut up for building purposes, it often happens that there are old Apple, Pear, and other trees very suitable for the work, which have to be removed; or a Thorn or a Yew-tree, &c., may be uprooted by the wind, or timber is being felled, and from these much material may be selected.

Failing crooked and distorted branches and loppings, the thinnings from Oak and Larch plantations, and Hazel rods from the copse, can be used for the lighter portions of Rustic Work. Where old hedge-row "Pollards" abound, they form excellent material for ferneries or alpine mounds. The rough bark from Oak, Chestnut, Larch, &c., is useful, and so are defective trunks, or branches of large trees, cut into short lengths or transverse sections for paving floors; these sections may be laid in patterns, but are more effective when they vary in diameter, giving less formal effect than when they are of equal size. An old Thorn hedge that has been for many years clipped by the shears, supplies excellent material

Rustic Work—*continued.*

for the smaller articles, such as vases, flower-stands, tables, and baskets; and the cones of Firs are particularly serviceable for the same purpose. In cases where no suitable timber can be felled, it often happens that a judicious thinning-out of branches may take place without the least detriment or disfigurement to the trees. Heather may be collected, bound in bundles, and closely stacked some time before using, as it then makes a closer thatch; the same remark applies to Reeds and Sedges. There are various mosses to be found on heaths, and in swamps, plantations, woods, &c., which should be carefully collected, and kept as straight as possible, to be used either for simply filling up chinks and crevices to exclude draughts, or as fillings in carpet-like patterns for the inside of summer-houses. In using mosses for this purpose, if above a seat or bench, the moss-work should be kept above the head-line of persons when seated. Below that line, a lining of split Hazel rods, with the bark side outwards, worked in diagonal, diamond, or other patterns, may be used. For moss-work of this description, as well as for the Hazel patterns, a comparatively smooth surface must be provided as foundation. Sometimes, this is done by making the back, sides, and ceiling of a summer-house, of ordinary carpenter's framework and boarding, when the outside may be covered with coarse bark, or slabs with the bark preserved, and the inside covered with moss, &c. The same object can be attained by sawing longitudinally through the trunks of moderate-sized trees, the bark adhering, and then setting them side by side vertically, to form the surface on which to work the moss pattern. The cones of the Stone and Cluster Pines are particularly useful for forming cornices, caps, &c., to Rustic buildings, and the smaller cones of the Larch and Scotch Fir may be employed for festoons, and in forming the interior decorations.

The disposition of Rustic Work, no less than its construction, requires an artistic eye and good taste. To speak in general terms, it should seldom come much "to the front"; that is to say, suitable positions for it will but seldom present themselves very near to the principal windows of a mansion—its place, for the most part, being in nooks and corners of shrubberies, plantation walks, the borders of woods, or in the wild garden. Let us imagine a situation, shut off from the more cultivated grounds. Such a position might have a Rustic gate flanked by a Rustic screen, on which *Cratægus Pyracantha*, or similar evergreens are trained; a broad, gravelled path, on each side of which are Rustic arches, with here and there an arch thrown over the path, and covered with Roses, Honeysuckle, Jasmine, &c., forming a vista, at the end of which a Rustic summer-house, its porch or verandah covered with Clematis, could be placed. On either side of the main walk, a breadth of turf, with a ribbon scroll of Ivy, so designed as to afford suitable positions for Rustic baskets or pyramids might be added, and the whole surrounded by a densely-planted, raised bank, for effectual shelter from cold winds. On the face of the bank, next the garden, logs and blocks may be interspersed, to afford receptacles for Ferns, alpine plants, or trailing shrubs. Such a garden might be formed in any existing mass of shrubbery that is large enough for the purpose, and would be an interesting addition to many already fine gardens. With smaller gardens, and where the house has no particular architectural features, a Rustic verandah, with roof of tiles or shingles, covered all over with Jasmine, Roses, Honeysuckle, &c., often gives a particularly cosy appearance. If in front of this there is room for a gravelled walk, a kind of terrace, and the ground lends itself to the formation of a grass slope, with a step or two down to the lawn or flower-garden, here is a pretext for a Rustic balustrade, with vases and Rustic steps, which will, at the same time, form a trellis for the smaller kinds of climbing plants. At some point, just out of sight of the

Rustic Work—*continued.*

windows (and if commanding a view of some fine scenery, so much the better), the Rustic arbour or summer-house may be placed, having its seat and table. If backed by shrubs, it will have a more snug appearance, and if flanked or extended at the base by partially plunging a few rough logs in the ground, interspersing them with hardy, evergreen Ferns and spring flowers, the charm of the picture would be enhanced. Should a boundary fence anywhere cross the view, as in the division of the lawn from the park or paddock, it may be somewhat masked by placing a line of Rustic arches across, and allowing the climbing plants upon them to assume a somewhat careless growth. For such a purpose, good, sound Larch poles are useful, as they will stand for several years.

In places where there is a large expanse of lawn, with glades of turf and spreading trees, and masses of shrubbery, Rustic beds, formed like baskets, vases, and pyramids, are pretty objects, if placed with judgment, and are very effective if associated with Ivy or Ferns.

Rustic buildings, when substantially constructed, are very appropriate, and, as a rule, harmonise better with the scenery than any of a more formal character, when used as boat-houses, rests and shelters in woods, gamekeepers' huts, &c. Rustic Work is also well adapted to foot-bridges over small streams in gardens, parks, and woods. It is better, in order to make such structures more secure, to have a pair of iron girders concealed beneath the woodwork. The planks for the pathway should be of some durable wood without sap; otherwise, they may soon rot, and cause accidents.

Any pits or hollows that occur in shrubberies or plantations, if overhung by shrubs or large trees, will often present a suitable site for a fernery; and where natural stone does not abound for making rockwork, an excellent effect may be obtained by the use of sufficiently massive logs. Any steps that may be required can be made from split sections of good-sized trees, placing them so that the split side forms the tread, and the bark side the riser. The "tods" of old Pollard-trees, and even sections of hollow trunks, when placed in suitable positions in woodland walks or drives, make good receptacles for trailing plants, or the better kinds of hardy Ferns. In such walks, and also in parks, sections of rough timber (provided the top is smoothed and very slightly bevelled, so as to throw off the rain), when placed in twos and threes at the base of spreading trees, form agreeable resting-places. Care must be taken to have them of variable sizes, so as to avoid formality.

The Rustic chair, as a rule more picturesque than useful, should be sparingly used, or at least only where apparently needed, and not too near the mansion, or in highly-dressed grounds.

RUTA (*Rute* was the old Greek name, probably from *ruomai*, to preserve; in allusion to the effects of the plant on health). Herb of Grace; Rue. Including *Haplophyllum* (or *Aplophyllum*). ORD. *Rutaceæ*. A genus comprising about forty species of hardy or half-hardy, strong-smelling, gland-dotted, perennial herbs or sub-shrubs, broadly scattered over the Mediterranean region and Western and Central Asia. Flowers yellow or greenish, sometimes cymose; calyx short, four or five-lobed or parted, persistent; petals four or five, imbricated, often toothed or ciliated; torus thick; stamens eight to ten; corymbs or panicles terminal, many-flowered, leafy-bracted. Leaves alternate, simple, trifoliolate, pinnatisect or decompound. Few of the species are of any horticultural value; all that call for mention are described below, and are hardy sub-shrubs, except where otherwise indicated. They are of easy culture in any light, rich soil. Propagated by seeds, or by cuttings. For culture, &c., of *R. graveolens*, *see* **Rue.**

Ruta—*continued.*

R. albiflora (white-flowered). *fl.* white; petals entire, shorter than the stamens; branches of panicle bracteate. July to September. *l.* supra-decompound; leaflets obovate, glaucous, pubescent, somewhat auricled, the terminal one large, obcordate. *h.* 2ft. Nepaul. An elegant, half-hardy sub-shrub, clothed with glandular pubescence. (H. E. F. 79.) *Bœnninghausenia albiflora* is the correct name of this plant.

R. angustifolia (narrow-leaved). A synonym of *R. Chalepensis*.

R. bracteosa (bracteate). *fl.*, petals ciliated. June to September. *l.* pinnate; leaflets oblong, on short stalks; the terminal one largest, the lower ones cut into three to five leaflets. *h.* 3ft. South Europe, &c., 1772. SYN. *R. macrophylla*.

R. chalepensis (Aleppo). *fl.*, petals ciliated; bracts small, ovate. June to September. *l.* supra-decompound, four times longer than broad; leaflets oblong-cuneate, almost equal, very glaucous. *h.* 2ft. Mediterranean region, 1722. SYN. *R. angustifolia* (B. M. 2311).

R. graveolens (strong-scented). Common Rue; Countryman's Treacle; Herb of Grace. *fl.*, the first one opening having usually ten stamens, the rest only eight; petals entire, or a little toothed. June to September. *l.* supra-decompound; leaflets oblong, the terminal one obovate. *h.* 3ft. South Europe, 1562. *variegata* is a useful garden form, having foliage spotted with white.

R. macrophylla (large-leaved). A synonym of *R. bracteosa*.

R. patavina (Paduan). *fl.* yellow, with a green central rib, in a dense corymb; petals glabrous, oblong, obtuse, attenuated at base; pedicels slender, scarcely as long as the flowers. June and July. *l.* glabrous; lower ones attenuated at base, oblong-spathulate; the rest trisected, with oblong or linear segments. Stem dwarf, simple, densely leafy. Orient, 1819.

R. suaveolens (sweet-smelling). *fl.* yellow, corymbose, having the smell of those of *Primula officinalis*; calyx a little fringed; petals obovate. June to September. *l.* entire, spathulately lanceolate, glaucous, smoothish. *h.* 2ft. Tauria, 1800. (B. M. 2254, under name of *R. linifolia grandiflora*.)

RUTACEÆ. A natural order of gland-dotted shrubs or trees, very rarely herbs, scattered over the temperate and warmer regions of the globe, occurring most copiously in South Africa and Australia. Flowers usually hermaphrodite; sepals four or five, imbricated, free or connate; petals four or five, hypogynous or perigynous, broadly imbricated, rarely valvate; stamens inserted at the base or on the margins of the torus, four or five, or eight or ten, very rarely fewer or indefinite; style short or elongated, distinct or connate; inflorescence variable, very rarely spicate or umbellate, in most cases cymose and axillary. Fruit a capsule or berry, rarely a drupe. Leaves exstipulate, usually opposite, simple or often compound, one, three, or five-foliolate or pinnate, frequently entire, occasionally serrulated; petioles sometimes biglandular at base. *Ruta graveolens* (Rue), grown in most gardens, is remarkable for its strong smell and acrid taste. *Citrus* is the most celebrated genus, on account of its fruits (Orange, Lemon, Lime, &c.); a volatile oil, obtained by distillation of the flowers and epicarp, and dissolved in alcohol, produces the well-known Eau de Cologne. The berries of some other genera from China and Japan are edible, as *Ægle Marmelos*, *Cookia punctata*, *Glycosmis citrifolia*, *Triphasia trifoliata*, &c. The order comprises about eighty-three genera and 650 species. Examples: *Citrus*, *Correa*, *Crowea*, *Ruta*.

RUTILANS. Deep red, with a metallic lustre.

RUYSCHIA (named in honour of Fred. Ruysch, Professor of Botany at Amsterdam; he died in 1731). SYN. *Souroubea*. ORD. *Ternströmiaceæ*. A genus comprising about eight species of stove, epiphytal or climbing shrubs, rarely arborescent, natives of tropical America. Flowers in terminal, often elongated racemes, supported by sessile, trilobed bracts at the tips of the pedicels; sepals five, closely imbricated; petals five, imbricated, connate at base; stamens five; bracteoles two, sepaloid. Leaves entire, coriaceous. *R. clusiæfolia*, the only species introduced, is an interesting under-shrub. It will thrive in a compost of vegetable mould and loam. Ripened cuttings will root freely if inserted in sand, under a bell glass, in heat.

Ruyschia—*continued.*

R. clusiæfolia (Clusia-leaved). *fl.* purple; bracts scarlet, dotted with red, obovate, acute, thick, deflexed, concavo-convex; racemes terminal, many-flowered, about 1ft. long; peduncles short. June. *l.* alternate, obovate, thick, shining, about 4in. long. *h.* 4ft. Guiana and the Caribbee Islands, 1823.

RYANIA (named after John Ryan, M.D., F.R.S., a correspondent of Vahl). SYN. *Patrisia.* ORD. *Bixineæ.* A genus comprising about half-a-dozen species of stove, stellately-pubescent trees, natives of tropical America. Flowers axillary, often showy, solitary or sub-fasciculate; sepals five, lanceolate or oblong, imbricated, persistent; petals absent; stamens indefinite Leaves entire, penni-nerved and transversely venulose, not dotted. *R. speciosa*, the only species introduced is a beautiful shrub. It thrives in a compost of peat and loam, and may be increased by ripened cuttings, inserted in sand, under a glass, in heat.

R. speciosa (showy). *fl.* somewhat cream-coloured, large; peduncles one-flowered. August. *l.* green on both surfaces, bearing stellate hairs on the ribs beneath. *h.* 10ft. West Indies, 1823.

RYMANDRA. A synonym of **Knightia** (which *see*).

RYSSOPTERYS (from *ryssos*, wrinkled, and *pteri*, a wing; alluding to the form of the wing of the fruit). ORD. *Malpighiaceæ.* A genus comprising about half-a-dozen species of slender, twining, stove or greenhouse shrubs, natives of the Indian Archipelago and Australia. Flowers whitish; calyx five-parted; petals scarcely clawed; stamens ten, all perfect; inflorescence terminal or falsely axillary, corymbiform; pedicels thickened above. Samaras one to three, expanded into broad wings at the apex, which are laterally tubercled. Leaves opposite, or nearly so, entire, the margins gland-bearing beneath; petioles slender, biglandular at the apex; stipules rather large. *P. microstema*, the only species yet introduced, requires stove heat; it should be grown in a compost of fibry peat and sandy loam. Propagation may be effected by cuttings, inserted in sand, under a bell glass, in bottom heat.

R. microstema (small-anthered). *fl.*, petals three or four times longer than the calyx; anthers minute; inflorescence equalling, or slightly exceeding, the leaves. August. *l.* broadly ovate, 3in. to 5in. long, 2¼in. to 3in. broad, somewhat cordate, mucronate, slightly sinuated on the margins, greyish-pubescent beneath. Java, 1820.

RYTIDOLOMA. A synonym of *Dictyanthus.*

RYTIGINIA. A synonym of **Vangueria** (which *see*).

SABADILLA. A synonym of **Schœnocaulon** (which *see*).

SABAL (said to be a native name in South America; but Adanson, who originated the genus, gives no explanation). Some of the species were formerly included under *Chamærops* and *Corypha.* ORD. *Palmæ.* A genus embracing six species of dwarf, tall, or nearly stemless, stove, greenhouse, or half-hardy, unarmed palms, inhabiting tropical and sub-tropical America. Flowers white or greenish, small, glabrous; spathes tubular; spadices large, elongated, decompound, at first erect, with slender, decurved or pendulous branches and branchlets; bracts and bracteoles minute. Fruit black, small or mediocre. Leaves terminal, orbicular or cuneate at base, flabellately multifid; segments linear, bifid, induplicate in vernation; rachis short or elongated; petioles concave above, the margins acute and unarmed. The species, most of which are highly ornamental, succeed in a light loamy soil. A few suckers are sometimes emitted; these should be taken off when about 1ft. long, and, if they have no roots, must at first be carefully nursed. Seeds, however, are by far the best means of propagation.

Sabal—*continued.*

S. Adansonii (Adanson's).* Dwarf Palmetto. *fl.*, petals united at the base; style thick; spadix erect, 3ft. to 6ft. high, smooth, slender. June and July. *fr.* black, ⅛in. in diameter. *l.* circular in outline, glaucous, fan-shaped, slightly pinnatifid, 2ft. to 3ft. high; divisions twenty to thirty, slightly cleft at apex, sparingly filamentous at the sinuses; petioles stout, concave, smooth-edged, shorter than the leaves. Trunk short, buried in the earth. Southern United States, 1810. Greenhouse or half-hardy. (B. M. 1434.)

S. Blackburniana (Blackburn's).* Fan or Thatch Palm. *fl.*, spadix rising from the sinus of the leaf, spreading, 4ft. to 5ft. long, glabrous, alternately branched; peduncle simple and compressed below. *l.* twenty to thirty, forming a sub-globose tuft, cordate-sub-orbicular, 5ft. to 6ft. long; segments of adult leaves about eighty, ensiform, long-acuminate, more or less deeply bifid at apex, the lower ones connate about two-thirds, the upper ones one-third, their length; petioles arcuate-spreading, 6ft. to 8ft. long, very convex at back, the margins acute and unarmed. Trunk cylindrical, nearly 1ft. in diameter, slow-growing, at length 20ft. to 25ft. high. Bermudas, 1825. This is admirably suited for a window plant when small, and for the sub-tropical garden in summer. SYN. *S. umbraculifera* (of Martius).

S. cœrulescens (bluish). *l.* (known only in the young state) elongated, linear-lanceolate, with a plicate surface and a bluish or glaucous tinge of green, which is most strongly marked on the under surface. West Indies (?), 1875. Greenhouse.

S. mauritiæformis (Mauritia-like). Savana Palm. *fl.*, spadix exceeding the leaves, the branches paniculate. *fr.* black, about the size of a pea. *l.* 12ft. in diameter, sub-orbicular, glaucous beneath, multifid to the middle, with loose fibres between the bifid lobes; petioles 7ft. to 8ft. long. Trunk 1ft. to 1½ft. thick, little annulate, but reaching a height of 60ft. to 80ft. Venezuela, Trinidad, 1860. Stove. SYN. *Trithrinax mauritiæformis.*

S. Palmetto (Palmetto).* Cabbage Palmetto; Palmetto Palm. *fl.*, petals slightly united at the base; style thick; spadix smooth and spreading, commonly shorter than the leaves. June. *fr.* black, four to five lines in diameter. *l.* 5ft. to 8ft. long, cordate in outline, flabellately-pinnatifid, recurved at the summit, the base long-persistent; divisions very numerous, deeply cleft, and with thread-like filaments at the sinuses; petioles smooth, concave, mostly longer than the leaves. Trunk erect, 20ft. to 40ft. high, simple, leafy at the summit. Southern United States, 1825. Greenhouse. SYN. *Chamærops Palmetto.*

S. serrulata (serrulated). A synonym of *Serenoa serrulata.*

S. umbraculifera (umbrella-bearing).* *fl.* whitish; petals equalling the stamens; spadix 4ft. to 5ft. long, with paniculate branches. *fr.* greenish-black, four to five lines in diameter. *l.* 4in. to 6in. in diameter, sub-orbicular, glaucescent, multifid to one-third to two-thirds, with loose fibres between the bifid lobes; petioles 6ft. to 8ft. long. Trunk at length 60ft. to 80ft. high. West Indies, 1825. Greenhouse.

S. umbraculifera (umbrella-bearing), of Martius. A synonym of *S. Blackburniana.*

SABBATIA (dedicated to L. Sabbati, an Italian botanist, who published a "Synopsis Plantarum," in 1745). American Centaury. ORD. *Gentianeæ.* A genus comprising thirteen species of hardy, annual or biennial, erect herbs, simple or paniculate above; they are natives of North America and Cuba. Flowers white or rose-purple, handsome; calyx five to ten-parted or cleft; corolla with a very short tube, rotate, with five to twelve ovate or narrow, twisted lobes; stamens five to twelve; anthers soon recurved or revolute. Leaves opposite, sessile or stem-clasping. Sabbatias are very elegant plants when in blossom; those described below are well worth cultivating in every collection. Seeds, as soon as ripe, should be sown thinly in pots, or on a shady border, in peaty soil; if the former plan is adopted, the pots should be placed in shallow pans of water, as the plants grow naturally in bogs and marshy places. All the species here given are North American, and flower in summer.

S. angularis (angular). Rose Pink. *fl.* on short peduncles; corolla rose-pink, rarely white, 1½in. wide, with a yellowish or greenish eye; calyx lobes ½in. to ¾in. long. *l.* ovate, somewhat acute, with a slightly cordate, clasping base. Stem erect, 1ft. to 2ft. high, pyramidally many-flowered. 1826.

S. calycosa (large-calyxed).* *fl.*, calyx lobes leafy, ¾in. to 1in. long, exceeding the almost white corolla; peduncles elongated, one-flowered. *l.* oblong or lanceolate-oblong, narrowed at base. Stem 5in. to 20in. high, diffusely forking. 1812. (B. M. 1600.)

S. campestris (field-loving).* *fl.*, corolla rose-colour, five-parted, equalled by the lanceolate calyx segments. *l.* ovate, the lower ones obtuse. Stem tetragonal, dichotomously branched; branchlets one-flowered. *h.* 1ft. 1855. (B. M. 5015; R. G. iii. 73.)

S. chloroides (Chlora-like). *fl.*, calyx lobes linear; corolla deep rose-coloured, rarely white, nine to twelve-parted, twice as long

Sabbatia—*continued.*

as the calyx. *l.* oblong-lanceolate. Stem loosely panicled above, 1ft. to 2ft. high. 1817.

S. paniculata (panicled). *fl.* disposed in many-flowered, corymbose cymes; calyx lobes linear, thread-like, much shorter than the white corolla. *l.* linear, or the lower ones oblong, obtuse. Stem brachiately much-branched. *h.* 1ft. to 2ft. 1817.

S. stellaris (star-like). *fl.*, calyx lobes awl-shaped, varying from half to nearly the length of the bright rose-purple corolla; peduncles elongated, one-flowered. *l.* oblong- or ovate-lanceolate, or the upper ones linear. Stem 6in. to 20in. high, loosely branched and forked. 1827.

FIG. 400. SACCHARUM ÆGYPTIACUM (see page 340).

SABBATIA (of Moench). A synonym of **Micromeria** (which *see*).

SABIACEÆ. A small but well-defined natural order of glabrous or pilose trees or shrubs, inhabiting tropical and sub-tropical regions, mostly of the Northern hemisphere. Flowers hermaphrodite or polygamo-dicecious, small or minute, rarely rather large, variably disposed, usually panicled; calyx four or five-parted, imbricated; petals four or five, equal or unequal, alternate with or opposite the sepals, imbricated; disk small, annular, lobed, rarely tumid; stamens four or five, inserted at

Sabiaceæ—*continued.*

the base or on the top of the disk opposite the petals, usually two perfect and three antherless. Fruit consisting of one or two dry or drupaceous, indehiscent carpels; endocarp crustaceous or bony, one-seeded. Leaves alternate, exstipulate, simple or pinnate, entire or serrated, penninerved. The wood of the Indian *Meliosma* is of excellent quality, and is in great demand for house-building. *Sabiaceæ* comprises four genera—*Meliosma*, *Ophiocaryon*, *Phoxanthus*, and *Sabia*—and about thirty-two species.

SABICEA (*Sabisabi* is the name of *S. aspera* in Guiana). SYNS. *Schwenkfelda*, *Schwenkfeldia*. ORD. *Rubiaceæ*. A genus comprising about twenty-eight species of stove, twining shrubs, often tomentose, villous, or pilose; they are all tropical, and inhabit America, Africa, and Madagascar. Flowers clustered in axillary, sessile or pedunculate, corymbose cymes or heads; calyx tube sub-globose, the limb long, three to six-lobed; corolla funnel-shaped or hypocrateriform, the limb of four or five short, valvate lobes; stamens five. Leaves opposite, oblong; stipules intrapetiolar, usually persistent, erect or recurved. Only two of the species have been introduced to cultivation. They require to be grown in a compost of peat, loam, and sand. Propagated by cuttings, inserted in sand, under a hand glass, in heat.

S. aspera (rough). *fl.* white, fascicled, sub-verticillate, sessile. June. *l.* elliptic, acuminate, rough above, villous beneath; stipules oval-oblong, acute. *h.* 6ft. Guiana, 1824.

S. hirta (hairy). *fl.* white; involucre of four leaflets; umbels three-flowered, shortly pedunculate. June. *l.* ovate-lanceolate, acuminate, hairy on both sides; stipules large, cordate-ovate, membranous. *h.* 6ft. Jamaica, 1825.

SABINEA (named in honour of Joseph Sabine, F.R.S., F.L.S., &c., some time Secretary of the Horticultural Society of London). ORD. *Leguminosæ*. A small genus (two or three species) of stove trees or shrubs, natives of the West Indies. Flowers pink, fascicled; calyx very shortly toothed; standard sub-orbicular, spreading or reflexed; wings falcate-oblong, free; keel incurved; bracts small; bracteoles absent. Pods linear, flat-compressed, two-valved. Leaves abruptly pinnate; leaflets deciduous, entire, exstipellate. These plants will thrive in a well-drained sandy loam. Propagation may be effected by young cuttings, inserted in a pot of sand, under a hand glass, in heat.

S. carinalis (conspicuous-keeled). *fl.* brigh scarlet, three to five in a fascicle, precocious; wings and standard, 1in. long; keel sixteen to eighteen lines long. *l.*, leaflets six to eight-jugal, distant, obtuse-mucronulate, oblong, five to six lines long.

S. florida (flowery). *fl.* rosy; wings and standard ¾in. long; keel ⅔in. long, semi-orbicular. *l.*, leaflets eight to fifteen-jugal, oblong or elliptic-oblong, ¼in. long.

SACCATE, SACCIFORM. Sac-shaped; in the form of a bag.

SACCHARUM (*saccharon* is the old Greek name for sugar; it is derived from the Sanscrit *carkara*). ORD. *Gramineæ*. A genus comprising about a dozen species of tall, mostly stove grasses, inhabiting tropical

Saccharum—*continued.*

and sub-tropical regions. Spikelets at the sides of the branchlets, dense, or ample and twin, one sessile, the other pedicellate; glumes four, three of which are empty, acute or somewhat bristly-acuminate; panicle terminal, densely pilose, sometimes ample and densely bundle-flowered, sometimes contracted into a dense spike. Leaves flat or narrow, convolute when dry. The most important species is *S. officinarum*, the Sugar Cane of commerce, one of our most valuable economic productions. It has been cultivated from time immemorial. The manufacture of sugar is supposed to have been derived from China. Some of the species are ornamental plants; a selection of the best-known is given below. They are all of simple culture in a light, rich soil, with a good heat. Propagation may be effected by suckers; or by cuttings of the stems, which will throw out shoots at their joints. The under-mentioned species require stove treatment, except where otherwise stated.

S. ægyptiacum (Egyptian).* *fl.*, panicle silvery-silky, crowded; 10in. to 12in. long; lower branches compound. July. *l.* numerous, long, ribbon-like, with a white midrib, and covered with soft, silky hairs, which impart a greyish appearance to the plants. Stems about 7ft. high. Algeria, 1866. A vigorous grass, forming a gigantic tuft, and rivalling *Bambusa*, *Erianthus*, and *Gynerium*. See Fig. 400 (page 339).

S. Munja (Munja). *fl.* all hermaphrodite; panicle large, oblong, spreading, the branches whorled, supra-decompound. Summer. *l.* hispid, marginate, long-linear, white-nerved, channelled. Stems 8ft. to 10ft. high. Benares, 1805. Plant wholly glabrous, except on the inside of the leaves at base.

S. officinarum (officinal). Sugar Cane. *fl.*, palea half as long as the third glume; outer glumes pointed, half to one third as long as the wool; panicle large, pyramidal, the common axis sulcate, the joints and pedicels glabrous below the wool. July. *l.* long and broad, dark green, hanging in graceful curves. Stems yellowish-green, stout, erect. *h.* 10ft. East Indies, 1597.

S. o. violaceum (violet). *fl.*, midrib of the second glume suppressed. Stems of a rich violet or plum-colour. West Indies, 1824.

S. procerum (tall). *fl.*, panicle diffuse, the branches whorled, compound and decompound. July. *l.* ensiform, the midrib white, the margins slightly hispid. Stems erect, 10ft. to 20ft. high. Bengal, 1822. This is allied to *S. officinarum*.

S. sinense (Chinese). *fl.* bivalved, unilateral; panicle ovate, the branches whorled, simple and compound. Stems 6ft. to 10ft. high. China, 1822. Greenhouse.

SACCOCHILUS. A synonym of **Saccolabium** (which *see*).

SACCOLABIUM (from *saccus*, a bag, and *labium*, a lip; alluding to the baggy lip). SYNS. *Robiquetia* and *Saccochilus*. Including *Œceoclades* (in part). ORD. *Orchideæ*. This genus embraces about thirty species of very fine, stove, epiphytal orchids, natives of the East Indies and the Malayan Archipelago. Flowers racemose or scattered, shortly pedicellate; sepals subequal, free, spreading or erecto-patent, flat or concave; petals nearly similar, sometimes broader, rarely narrower; lip sessile at the base of the column, spurred or saccate at base, the lateral lobes erect, often small, the middle one spreading or erect, polymorphous; column short; pollen masses two; peduncles lateral, simple or branched. Leaves distichous, spreading, coriaceous, fleshy, or slender, flat or rarely terete. Stems leafy, not pseudo-bulbous. "In their habit of growth, the species of *Saccolabium* are similar to those of *Aërides*, and they require the same degree of heat, and the same general treatment, except that they are best grown in baskets suspended near the roof, so that they may receive all the light possible, and not too much shade—only enough to preserve their foliage from being scorched. The more light they receive, the more vigorous and better matured will be their growth, and this will lead to the production of fine floral racemes. They will also thrive in pots, placed near the glass, and on blocks; but, grown on this latter plan, they require more water. They are propagated in the same way as the Aërides, and are liable to become infested by the same sorts of insects" (B. S. Williams). The best-known species are here described. Some of

Saccolabium—*continued.*

them should find a place in every collection, as they are very handsome plants, even when not flowering.

S. acutifolium (acute-leaved).* *fl.* about ¾in. in diameter, in small corymbs, on stiff peduncles 2in. to 3in. long; sepals and petals yellow, obovate, acute; lip pale pink, concave at base, where it has a rounded lobe on each side. *l.* 6in. long, sessile, slightly amplexicaul, oblong-lanceolate, very acute, flat, apparently fleshy. Stems 6in. high. Khasya, 1837. (B. M. 4772 and P. M. B. vii. 145, under name of *S. denticulatum*.)

S. ampullaceum (flask-formed). A synonym of *S. rubrum*.

S. bellinum (pretty). *fl.* borne in a compact corymb, on a decurved peduncle; sepals and petals straw-colour, blotched with dark brown; lip white, spotted with mauve-purple, fleshy, having on each side a large cushion of filiform processes, yellow and spotted with red in the centre. February and March. *l.* lorate, obliquely bifid. Stems erect, short. Burmah, 1884. (W. O. A. 156.)

S. Berkeleyi (Berkeley's).* *fl.* large, disposed in a loose raceme; sepals and petals white, spotted and striped with amethyst; lip acute, not bilobed, the anterior blade amethyst. *l.* præmorse. Probably Andaman Islands. A beautiful species.

S. bigibbum (bigibbous).* *fl.* about eight in a drooping, subcorymbose, shortly-pedunculate raceme; sepals and petals pale yellow, spathulate; lip remarkable, white, triangular, with a very broad, blunt spur, the edges frilled, the centre yellow. November. *l.* persistent, linear-oblong, bifid, bright green, about 4in. long. Stems very short. Rangoon, 1868. A rather rare, close-growing species. (B. M. 5767.)

S. Blumei (Blume's). A synonym of *Rhynchostylis retusa*.

S. borneense (Bornean).* *fl.* of a peculiar ochre-cinnamon colour, something like those of a Sarcanthus, produced in a nodding, dense raceme; sepals and petals oblong, acute, connivent; spur of the lip clavate and depressed, with an abrupt, broad top; side laciniæ rounded and toothleted, the middle one almost terete, with an apiculus. *l.* broad, short, unequally bilobed, very fine. Borneo, 1881.

S. buccosum (inflated). *fl.* yellowish, with a few dark purplish-brown dots on the side laciniæ of the lip and on the spur, erect, small; sepals oblong, acute; petals ovate, shorter than the sepals; blade of the lip trifid, the lateral segments ovate, acute, the middle one lanceolate, acute, carinate; raceme few-flowered, rather dense. *l.* ligulate, obliquely and obtusely bilobed at apex. Moulmein, 1871.

S. calopterum (beautiful-winged).* *fl.* rich purple, white at the base of the sepals and petals, rather large, much like those of *Vanda cærulescens*; petals spathulate, acute; lateral laciniæ of lip elongated, with a free, acute apex; middle one triangular, acute, much smaller; panicle flexuous. New Guinea, 1882.

S. cœleste (celestial).* *fl.*, sepals and petals tipped with sky-blue, blunt, cuneate-oblong; anterior part of the lip blue, the compressed, recurved spur also having a blue tint on both sides of its centre; two falcate, subulate bodies rise from the apex inside the spur; inflorescence short and dense, 3in. to 4in. long. Probably Moulmein. Habit similar to that of *S. curvifolium*.

S. curvifolium (curved-leaved).* *fl.* cinnabar-red, small, crowded in erect, axillary racemes, freely produced. May and June. *l.* linear, acutely præmorse, deflexed, channelled, light green. Stem erect, 6in. to 12in. high. East Indies. A handsome, compact species, thriving well on a block suspended from the roof. (I. H. 493; W. O. A. 107; B. M. 5326, under name of *S. miniatum*.)

S. c. luteum (yellow). *fl.* clear yellow. Moulmein. A rare variety.

S. dives (rich). *fl.* whitish-yellow, small, very numerous. *l.* stout, straight, linear-ligulate, unequally bilobed at the apex, 7in. long, about ⅜in. wide. India (Bombay district), 1875. A very curious plant.

S. flexum (bent). *fl.* red; sepals and petals ligulate, obtuse or acute; lip trifid, the lateral laciniæ obtuse-angled, minute, the middle one triangular with a thickened limb; racemes small, porrect. New Guinea, 1882.

S. fragrans (fragrant). *fl.* white, numerous, violet-scented, in rich racemes; tops of the sepals and petals, and the whole of the pandurate lip, fine mauve-purple; spur curved, blunt. *l.* few, oblong, acute, full of rugosities and depressions, reticulated, dark green, with some dirty purple underneath. Burmah, 1882.

S. furcatum (forked). *fl.* white, spotted with rose-colour, more loosely disposed than in *Rhynchostylis retusa*. July and August. *l.* stout, about 8in. long. India, Java. A distinct and somewhat slow-growing species.

S. giganteum (gigantic).* *fl.* very sweetly perfumed, freely produced, in long, dense, drooping racemes; sepals and petals white, spotted with amethyst; lip of a beautiful mauve-violet, cuneate, dilated. Winter. *l.* broadly lorate, 1ft. long, 3in. wide, obliquely bilobed, stout, streaked. Stem short, erect. Burmah, 1864. (B. M. 5635; W. O. A. 56.) SYN. *Vanda densiflora* (F. d. S. 1765-6).

S. g. illustre (illustrious). *fl.* richer-coloured, larger, and more loosely disposed, than in the type; lip of a brighter hue; raceme

Saccolabium—*continued.*

longer. *l.* longer and broader, more prominently veined. Cochin China. A handsome variety. (I. H. ser. iii. 517.)

S. Græffei (Dr. Graeffe's). *fl.* deep purple, pendent, conspicuous; blade of the lip short, three-toothed, having a transverse lamella in front of the base of the middle lacinia; spur cylindrical, blunt, constricted; spike borne on a strong peduncle. *l.* broad, ligulate, retuse, bilobed. Viti Islands, 1881.

S. gurwalicum (Gurwal). *fl.* white, with the exception of the amethyst lip, and some similarly-coloured blotches on the sepals and petals; spur hairy inside. India, 1879. A pretty plant, resembling *Rhynchostylis retusa* in habit, but only about half the size of that species. The proper name of this plant is *Rhynchostylis gurwalicum.*

S. guttatum (striped). A synonym of *Rhynchostylis retusa.*

S. Harrisonianum (Harrison's). A variety of *S. violaceum.*

S. Hendersonianum (Henderson's). *fl.* numerous, in erect, axillary racemes; sepals and petals of a beautiful rose-colour; lip white, compressed, reduced to little besides the spur. *l.* about 6in. long, ligulate, keeled, of a lively green. Borneo, 1862. A small, compact-growing species. (B. M. 6222.)

S. Huttoni (Hutton's). *fl.* borne in a rather open raceme, 1ft. long; sepals and petals of a beautiful rose-colour; lip bright amethyst. *l.* coriaceous, distichous, loriform, keeled, unequally bilobed at the apex. Stem short. Java, 1867. (B. M. 5681.) SYN. *Aërides Huttoni.*

S. mimus (mimic). *fl.* rose-purplish, tipped with green; sepals and petals ligulate, acute; lip having semi-ovate, erect side laciniæ, a triangular middle segment, and a cylindrical, slender spur, with a bent, dilated apex, equalling the pedicellate ovary; racemes one-sided. *l.* oblong-ligulate, with two blunt, unequal lobes, 5in. long, nearly 2in. broad. South Sea Islands, 1878.

S. miniatum (scarlet). *fl.* of a brilliant orange-red, small, disposed in short, spreading, cylindrical racemes. March and April. *l.* lorate, channelled, obliquely truncate at apex. Stems short, erect. Java, 1846. A pretty and distinct, but not very showy orchid. (B. R. 1847, 58.)

S. m. citrinum (citron-coloured). *fl.* lemon-yellow, with a dark centre; inflorescence rich, dense. Philippine Islands, 1884.

S. papillosum (papillose). *fl.* white, painted with yellow and purple; sepals fleshy, linear-ovate, obtuse; lip papillose, with an obconical, obtuse spur; racemes small, one-third the length of the leaves, capitate. May and June. *l.* ligulate, 4in. to 6in. long, præmorse at apex, dark green. Stem arcuate, nearly 1ft. long. Malabar, 1840. (B. R. 1552.) SYN. *S. præmorsum* (F. d. S. vii. p. 92; G. M. B. i. p. 253).

S. præmorsum (bitten). A synonym of *S. papillosum.*

S. pumilio (dwarf). *fl.* small, in a bent, cylindrical, dense raceme, shorter than the leaves; sepals and petals yellowish, ligulate, obtuse; lip white, with some purplish marks on the blade. *l.* scarcely more than 3in. long, nearly 1in. wide, oblong, unequally bilobed at apex, dark green above, purple beneath. Manilla, 1875.

S. retusum (retuse). *fl.* of a waxy-white, spotted with pink, produced in great abundance in long racemes. May and June. Java. "A fine, handsome, free-growing form, and probably one of the many varieties of *Rhynchostylis retusa* indicated by Reichenbach when treating of this species. It is more robust in habit than most other forms" (B. S. Williams). (F. d. S. 1463-4.)

S. rubrum (red).* *fl.* of a beautiful deep rose-colour, in dense, erect, axillary, oblong racemes about 6in. long; sepals and petals ovate; lip linear, with a long, slender, compressed spur. May and June. *l.* dark green, thick, ligulate, channelled, 3in. to 4in. long, truncate and toothed at apex. Stem simple, erect, 8in. to 10in. high. India, 1839. A distinct species, succeeding on a block or in a basket. SYN. *S. ampullaceum* (B. M. 5595; L. S. O. 17; P. M. B. xiii. 49; W. O. A. 191).

S. r. moulmeinense (Moulmein). *fl.* of a uniform, rich, deep rose, larger than in the type, spike longer and denser. *l.* spotted with dull brown. A superb, robust variety. (F. M. 393, under name of *S. ampullaceum roseum.*)

S. speciosum (showy). This is the correct name of the plant described in this work as *Aërides maculosum.*

S. Turneri (Turner's).* *fl.* lilac-spotted, very beautiful, densely produced in racemes fully 2ft. long. June. *l.* about 1ft. long and 1½in. broad, distinctly præmorse at the apex. India, 1878.

S. violaceum (violet).* *fl.* very numerous, borne in showy, axillary racemes 1ft. to 1½ft. long; sepals and petals pure white, spotted with mauve; lip of a dark mauve, marked with deeper-coloured lines. January and February. *l.* 1ft. or more long, 2in. broad, recurved, deep green, somewhat striated with lines of a deeper colour. Stems stout, erect. Manilla, 1839. SYN. *Vanda violacea* (B. R. 1847, 30).

S. v. Harrisonianum (Harrison's).* *fl.* pure white, large, very sweet-scented, borne in dense, axillary racemes sometimes 2ft. long. Winter. *l.* broadly oblong, keeled beneath, striated, unequally bilobed at apex, of a rather lighter green than those of the type. Pulo Copang, 1864. (B. M. 5433, F. d. S. 2412, and W. O. A. 236, under name of *S. Harrisonianum.*)

Saccolabium—*continued.*

S. Witteanum (Witte's). *fl.* in a loose, elongated raceme; sepals and petals orange, with reddish spots; lip white, with some purple markings, and a green apex to the spur, the mouth of which is covered by three teeth. *l.* cuneate-oblong, toothed at apex, 2ft. or more long. Java, 1884. In general appearance, this plant resembles *Sarcanthus densiflorus.*

SACCOLOMA. Included under *Davallia.*

SACCUS. A bag or cup. The term is occasionally applied to the crown of *Stapelia*, &c.

SACRED BEAN OF THE EGYPTIANS. In books, the plant called by this name is generally said to be *Nelumbium speciosum*, but recent researches have proved it to be *Nymphæa Lotus.*

SADDLE GRAFTING. *See* **Grafting.**

SADDLE-SHAPED. Oblong, with the sides hanging down, after the manner of the laps of a saddle.

SADDLE-TREE. A common name for *Liriodendron tulipiferum.*

SADLERIA (named after Joseph Sadler, Professor of Botany at Pesth). ORD. *Filices.* A genus comprising only a couple of species of arborescent, stove ferns, natives of the Sandwich Islands and Sumatra. Sori in a continuous line, close to the midrib on both sides, placed on an elevated receptacle; involucre narrow, sub-coriaceous, at first wrapped over the sorus, afterwards spreading. Only one of the species has been introduced to our gardens. It is a fine plant, combining the habit of a small Cyathea with the fructification of a Blechnum. For general culture, *see* **Ferns.**

S. cyatheoides (Cyathea-like). *cau.* 3ft. to 4ft. high. *sti.* strong, erect, 6in. to 18in. long, naked except at the base, and there clothed with long-linear scales. *fronds* 4ft. to 6ft. long, 9in. to 18in. broad; pinnæ 8in. to 12in. long, ½in. to ¾in. broad, cut down to the rachis into very numerous, connected, linear pinnules, ⅛in. to ¼in. long, acute or bluntish. Sandwich Islands, 1877. (G. C. n. s., vii. p. 761.)

SAD-TREE. *See* **Nyctanthes arbor-tristris.**

SAFFLOWER. *See* **Carthamus.**

SAFFRON, MEADOW. *See* **Colchicum.**

SAFFRON-PLANT. A common name for *Crocus sativus.*

SAFFRON THISTLE. *See* **Carthamus tinctorius.**

SAGE (*Salvia officinalis*). An evergreen undershrub, native of Southern Europe, and sufficiently hardy to withstand any ordinary winter outside. The uses of Sage for stuffing, &c., are well known. The plants succeed best in a warm and rather dry border, but they grow well almost anywhere in ordinary garden soil. Propagated occasionally by seeds, but more generally from cuttings, or rooted slips, which may often be procured in quantity. Cuttings for propagating should be taken early in summer from the growing points, and inserted, under a hand glass, in a shady border outside. A space of not less than 1ft. apart should be allowed when planting out permanently afterwards.

SAGE BUSH. A name applied to various species of *Artemisia.*

SAGE, JERUSALEM. *See* **Phlomis fruticosa.**

SAGENIA. Included under **Nephrodium** (which *see*).

SAGE OF BETHLEHEM. *See* **Pulmonaria officinalis.**

SAGERETIA (named after M. Sageret, a distinguished French agriculturist). ORD. *Rhamneæ.* A genus comprising about half-a-score species of stove or greenhouse shrubs, with slender or rigid, unarmed or spiny branches, natives of Central and Southern Asia, Java, and the warmer parts of North America. Flowers small,

Sageretia—*continued.*

five-parted. Leaves sub-opposite, shortly petiolate, oblong or ovate, pinnately nerved and reticulated, entire or serrated; stipules minute, deciduous. *S. hamosa*, perhaps the only species introduced, is probably lost to cultivation in this country.

SAGE ROSE. An old name for the genus *Cistus*.

SAGINA (from *sagina*, fatness; alluding to the presumed nourishing qualities of the plants for sheep). Pearl Weed; Pearlwort. ORD. *Caryophylleæ*. A genus comprising about eight species of small, tufted, annual or perennial herbs (mostly weeds), natives of the temperate and frigid regions of the Northern hemisphere, one being also broadly dispersed over the Southern hemisphere. Flowers small, usually long-pedicellate; sepals four or five; petals four or five, entire or loosely emarginate, sometimes minute or wanting. Leaves subulate. *S. pilifera* is a hardy evergreen, suitable, in some situations, as a substitute for grass edging. "To raise from seed, sow in May. To establish an edging from plants, plant patches in September, about 2in. apart. They require to be frequently beaten flat with the back of the spade. It seems too apt to become patchy to be relied on for any extensive surface, like a lawn" (N. E. Brown).

S. pilifera (hair-bearing). *fl.* white; petals twice as large as the calyx; peduncles very long. July and August. *l.* opposite, linear, awned, rather stiff, glabrous, in bundles. Stems creeping, branched, tufted. *h.* 2in. Corsica, 1826.

S. p. aurea (golden). This only differs from the type in its golden-yellow foliage. It is a good plant for carpet bedding.

SAGITTARIA (from *sagitta*, an arrow; alluding to the prevalent form of the leaves). Arrow-head. ORD. *Alismaceæ*. A genus consisting of about fifteen species of stove, greenhouse, or hardy, marsh-loving, usually erect, perennial herbs, inhabiting temperate and tropical regions. Flowers white, usually ternately whorled, spicate or panicled, pedicellate, three-bracted (in one species one-bracted) at the nodes; perianth segments six, in two series, the outer ones persistent, the inner ones larger, petaloid, deciduous; stamens nine or more, usually numerous; scape erect, slender or robust. Leaves on long or often thick petioles, elliptic-lanceolate or sagittate, often pellucid-dotted or lineolate. The under-mentioned species are hardy, except where otherwise stated. They require a loamy soil, and may be readily increased by division. All flower in summer.

S. acutifolia (acute-leaved). A synonym of *S. graminea*.

S. graminea (grass-like). *fl.*, lower whorls fertile; bracts usually connate; pedicels slender; scape very slender, erect, 1ft. to 2ft. high. *l.* varying from ovate-lanceolate to linear, or reduced to broad and acute phyllodes, scarcely ever sagittate. North America, 1812. SYN. *S. acutifolia*.

S. heterophylla (variable-leaved).* *fl.* of the lowest whorl fertile and almost sessile, the sterile ones on long pedicels; bracts obtuse; scape weak, 2ft. to 3ft. high, at length procumbent. *l.* lanceolate or lanceolate-oval, entire or with one or two narrow, basal, sagittate, appendages. North America, 1822.

S. h. rigida (rigid). *l.* rigid, narrowly lanceolate, acute at both ends; petioles stout. A tall form. (B. M. 1632, under name of *S. rigida*.)

S. lancifolia (lance-leaved). *fl.* on slender pedicels; several of the lower whorls fertile; bracts acute or acuminate; scape 2ft. to 5ft. high. *l.* lanceolate or lanceolate-oblong, rarely linear, all with a tapering base, 6in. to 18in. long, on long, stout petioles, never sagittate. North America and West Indies, 1787. Greenhouse. (A. B. R. 333; B. M. 1792.)

S. l. angustifolia (narrow-leaved). A variety having the blades of the leaves very narrow or all deficient. Plant much smaller, in all its parts, than the type. (B. R. 1141, under name of *S. angustifolia*.)

S. montevidensis (Monte Video).* *fl.* white, with a crimson spot at the base of each petal, large, in lax whorls, borne on a tall scape; scapes bearing the female flowers much stouter, and the pedicels shorter, than those of the males. *l.* sagittate. South America, 1834. An exceedingly handsome, free-flowering, stove or greenhouse aquatic. (B. M. 6755; Gn. xxvii. p. 8 I. H. 1884, p. 189.)

Sagittaria—*continued.*

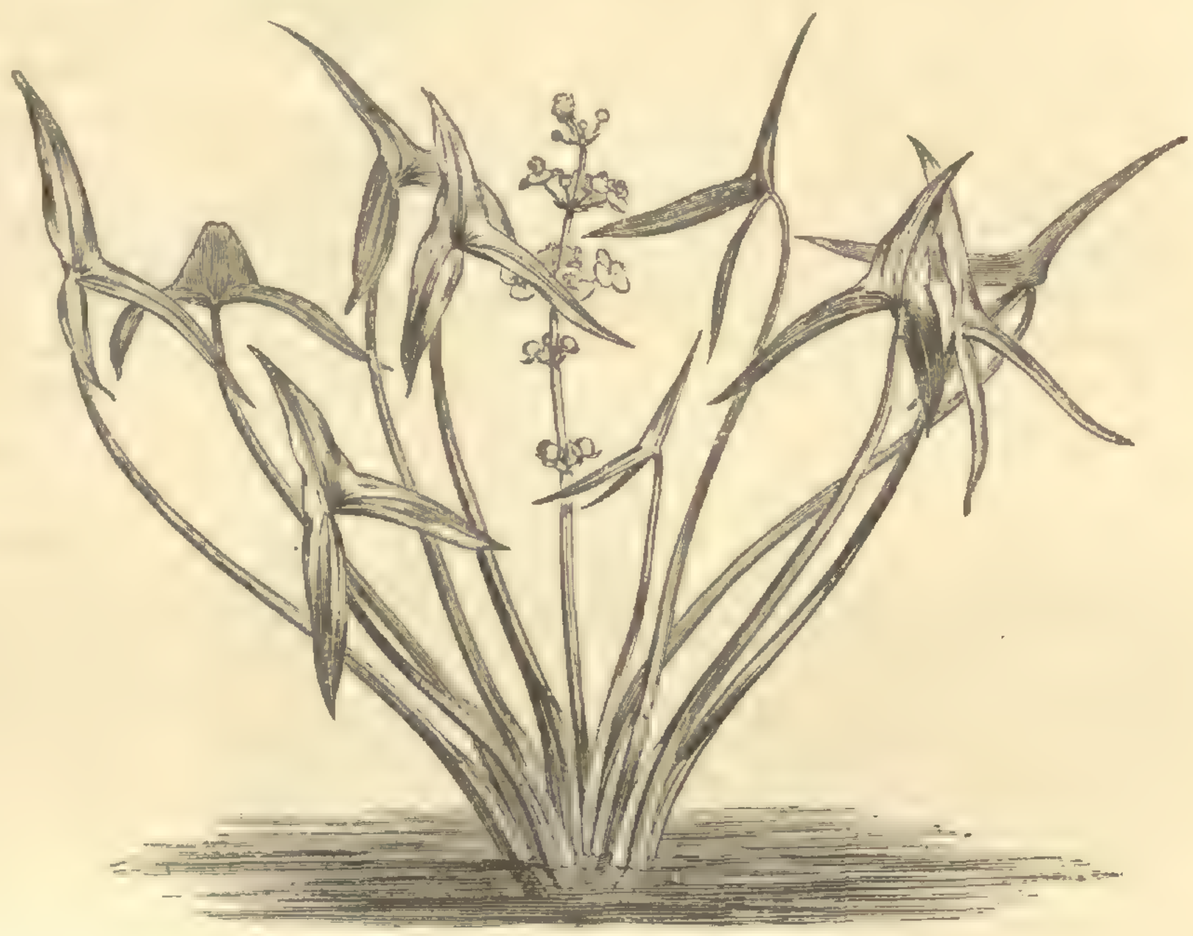

FIG. 401. SAGITTARIA SAGITTIFOLIA.

S. sagittifolia (Arrow-leaved).* Common Arrow-head. *fl.* ½in. in diameter, males large; petals with purple claws; whorls three to five, distant, three to five-flowered; scape 6in. to 18in. high. *l.*, blade hastate, obtuse or acute, 2in. to 8in. long, erect, the lobes long, more or less diverging, acuminate, the first developed submerged; petioles stout, 8in. to 18in. long. Stems swollen at base, stoloniferous. Europe (Britain), &c. See Fig. 401. (Sy. En. B. 1436.) *S. diversifolia* is a variable-leaved form. (B. M. 1631, under name of *S. sinensis*.)

S. variabilis (variable). *fl.*, one or more of the lower whorls fertile; petals with white claws; filaments about twice the length of the anthers; pedicels of the fertile flowers about half the length of those of the sterile ones; scape 3in. to 4ft. high. angled. *l.* very variable, almost always sagittate. North America, 1818.

S. v. flore-pleno (double-flowered). A form with double flowers.

S. v. hastata (halberd-shaped). *l.* narrow, halberd-shaped or sagittate.

S. v. latifolia (broad-leaved). *l.* broad, acute, sagittate.

S. v. obtusa (obtuse). *l.* broadly sagittate, obtuse, 6in. to 12in. long.

FIG. 402. SAGITTATE LEAF.

SAGITTATE, SAGITTIFORM. Resembling an arrow-head in shape. A Sagittate leaf is shown at Fig. 402.

SAGONEA. A synonym of **Hydrolea** (which *see*).

SAGRÆA (named in honour of Ramon de la Sagra, Director of the Botanical Gardens in Havannah, of which he wrote an account in 1827). SYN. *Staphidiastrum*. ORD. *Melastomaceæ*. A genus comprising about twenty-seven species of stove, villous, bristly, or tomentose, rarely glabrous shrubs, closely allied to *Clidemia*, natives of equatorial America. Flowers small or minute, disposed in small or large, axillary, solitary or fascicled panicles; calyx four-lobed; petals four, obtuse or retuse; stamens eight. Berries four-celled, often hairy. Leaves sessile or petiolate, ovate, oblong, or cordate, three to seven-nerved, entire or denticulated. A selec-

Sagræa—*continued.*

tion from the introduced species is here presented. For culture, *see* **Melastoma.**

S. hirsuta (hairy). *fl.* white; petals ovate, acute; peduncles axillary, trifid. May. *fr.* dark purple, hairy. *l.* oblong-lanceolate, acuminate, denticulated, densely hairy on the nerves beneath; petioles (as well as the peduncles and calyces) bristly, slightly purplish, hirsute. *h.* 6ft. 1823.

S. sessiliflora (sessile-flowered). *fl.* red; crowded in the axils, sub-sessile; petals oval, obtuse. April. *l.* sub-sessile, oval, acuminate, crenulated, seven-nerved, ciliated, densely bristly-pilose above, villous-hairy beneath. Branches terete, densely-rufous-hairy. *h.* 4ft. 1793.

S. umbrosa (shade-loving). *fl.* red; petals obovate; panicles axillary, loosely trichotomous, slightly hispid, as long as the petioles. March. *l.* broadly ovate, acuminate, serrulated, ciliated, densely pilose on the nerves; petioles 1½in. long. *h.* 6ft. 1824.

SAGRÆA (of Naudin). A synonym of **Ossæa** (which *see*).

SAGUERUS. A synonym of *Arenga.*

SAGUS (in part). A synonym of **Metroxylon** (which *see*).

ST. ANDREW'S CROSS. *See* **Ascyrum Crux-Andreæ.**

ST. BARBARA'S HERB. A common name for *Barbarea vulgaris.*

ST. DABEOC'S HEATH. *See* **Dabœcia polifolia.**

SAINTFOIN. *See* **Onobrychis sativa.**

ST. JOHN'S BREAD. A common name for *Ceratonia Siliqua.*

ST. JOHN'S WORT. *See* **Hypericum perforatum.**

ST. JOSEPH'S LILY. *See* **Lilium candidum.**

ST. MARTIN'S FLOWER. A common name for *Alstrœmeria pulchra.*

ST. MARTIN'S HERB. *See* **Sauvagesia erecta.**

ST. MARY'S WOOD. A common name for *Calophyllum inophyllum.*

ST. PATRICK'S CABBAGE. *See* **Saxifraga umbrosa.**

ST. PETER'S WORT. A name applied to *Ascyrum stans*, *Hypericum Ascyron*, *Primula officinalis*, and the genus *Symphoricarpus.*

SALACCA. *See* **Zalacca.**

SALACIA (a mythological name after Salacia, wife of Neptune). Including *Anthodon* and *Johnia.* ORD. *Celastrineæ.* A large genus (sixty to seventy species) of climbing or sarmentose, stove shrubs or small trees, inhabiting the tropical and sub-tropical regions of Asia, Africa, and America. Flowers usually axillary, on short branchlets, fascicled or cymose, rarely solitary or binate, sometimes paniculate; calyx small, five-parted; petals five, spreading, imbricated; stamens three, very rarely two or four. Fruit a one to three-celled berry, occasionally large, edible. Leaves generally opposite, petiolate, coriaceous, shining above, entire or crenate-serrate, exstipulate. The majority of the species are of no great beauty, and are only worth growing in botanical collections. Those usually seen in gardens are described below. They thrive in sandy loam, and may be propagated by ripened cuttings, inserted in sand, under a glass, in heat.

S. prinoides (Prinos-like). *fl.* greenish-yellow, small; peduncles axillary, one-flowered. June. *fr.* one-seeded, about the size and shape of a small cherry. *l.* serrate. East Indies, 1820. Climber. SYN. *Johnia coromandeliana.*

S. pyriformis (Pear-shaped). *fl.* greenish-yellow, small; peduncles axillary, one-flowered, aggregate. June. *fr.* about the size of a Bergamot Pear, with a very sweet taste. *l.* oblong, slightly toothed. *h.* 5ft. Upper Guinea, 1825. Shrub.

S. Roxburghii (Roxburgh's). *fl.* orange-coloured, small; peduncles axillary, one-flowered. June. *fr.* dull red, two or three-seeded, with white pulp. *l.* broad-lanceolate, entire. *h.* 4ft. Chittagong, 1822. A small tree. SYN. *Johnia salacioides.*

SALAD BURNET. *See* **Burnet** and **Poterium Sanguisorba.**

SALADS. Plants for these are in daily request, and it is therefore important to maintain a supply all the year round, so far as circumstances admit. Lettuces stand first as Salad plants; they should always be well blanched when sent to table. Endive is invaluable in autumn and winter. Mustard and Cress may be obtained ready for use in about a week at almost any time of year, if a little heat is at command. Other plants which enter more or less into the composition of Salads are: Beet, Chervil, Chicory, Chives, Radishes, Tarragon, and Tomatoes. Details of the culture of these plants may be found under their several headings.

SALAL OR SALLON-SHRUB. A common name for *Gaultheria Shallon.*

SALDANHA. A synonym of **Hillia** (which *see*).

SALICINEÆ. A natural order of trees or shrubs, chiefly inhabiting Northern temperate and frigid regions, a few being natives of South Africa and South America. Flowers dicœcious, disposed in catkin-like spikes or rarely racemes, each furnished with a membranous, entire or lobed bract; perianth replaced by a glandular or urceolate disk; stamens of the male flowers two or numerous, inserted on the centre of the torus; ovary of the females sessile or shortly stipitate; style short or very short, two or four-fid. Capsule ovoid or oblong, usually acuminate, dehiscing in two to four valves at the base. Leaves alternate, entire, serrulated, toothed or rarely lobed, penniveined or three-nerved, deciduous; stipules free, scaly and deciduous, or foliaceous and leafy. The only two genera—*Populus* and *Salix*—contribute some ornamental subjects to our gardens. Most of the species possess astringent and bitter principles. Poplar wood, although soft, is valued for its lightness; while that of several species of *Salix*, particularly the Osier (*S. purpurea*, *S. viminalis*, and *S. vitellina*), is in great demand by basket-manufacturers, coopers, and gardeners. The number of species comprised in *Salicineæ* is estimated, by various authors, at between 150 and 300.

SALICORNIA (from *sal*, salt, and *cornu*, a horn; alluding to the economical products and the horn-like branches of the plants). Glasswort; Marsh Samphire. ORD. *Chenopodiaceæ.* A small genus (about eight species) of greenhouse or hardy, annual or perennial, leafless, seashore herbs, broadly dispersed. Flowers in terminal, short or elongated, cylindrical spikes. *S. herbacea* (Crab Grass) and *S. radicans* represent the genus in Britain. "The various species of this genus, as well as others belonging to the same family, and growing abundantly on the coasts in the South of Europe and North of Africa, yield a vast quantity of soda, much employed in making both soap and glass, whence comes the English name Glasswort" (Hooker and Arnott). The ashes of these and allied plants were formerly imported under the name of Barilla; but since the introduction of Le Blanc's process for obtaining soda from common salt, Barilla has not been much used. The species have no horticultural value.

SALIGOT. An old name for **Trapa nutans** (which *see.*)

SALINE MANURES. These are contrasted with farmyard Manures and others that contain abundant organic matter, *i.e.*, remains of animals and of plants. The Saline Manures, consisting of mineral substances, are compounds or "salts" of various metals. They differ widely in composition, some being made up of one mineral substance alone, others being compounds of several, mixed naturally or artificially. The artificial Manures are largely employed on farms, and, to some extent, in gardens, to improve the crops either in quantity or in quality. They differ much in their mode of action:

Saline Manures—*continued.*

some of the substances supply to the plants those minerals that are required by all of them, as shown by the chemical analysis of their ashes; *e.g.*, Potassium Chloride supplies to plants the elements Potassium and Chlorine, both of which, but especially the former, are required by them. Ammonium Sulphate, which is often made use of as a Manure, supplies Nitrogen in a form readily taken up by plants. Other Saline Manures serve as food for the plants not only directly, but even still more efficiently by rendering certain injurious acids and other substances harmless, or by acting on various substances already in the soil, changing them from an insoluble to a soluble condition. Plants are able to absorb the substances thus changed, and to employ them as food. As examples of such Manures, Carbonates of Potash and of Soda, and Gypsum or Sulphate of Lime, may be mentioned.

The views generally entertained in regard to the uses of the various elements in Saline Manures may be summed up as follows:

Potassium is concerned in the formation of starch, as is shown by the absence of the latter from plants from which the element is completely withheld. Such plants soon cease to grow; but growth is resumed on Potassium being again given. Potassium Chloride is the best source of this element for plants, and Potassium Nitrate (saltpetre) is the next best. Potassium Sulphates and Phosphates are less efficacious.

Sodium compounds are abundant in many plants near the seashore; but Sodium does not seem essential; at least, plants from which it is withheld often grow equally well with others to which it is supplied.

Calcium and *Magnesium* are always present, though varying much in amount. The absence of Calcium checks growth after a time; but the exact use of each element is uncertain. Possibly, both benefit plants, "partly in serving as a vehicle for Sulphuric and Phosphoric acids in the absorption of food materials, and partly in fixing the Oxalic Acid, which is poisonous to the plant, and in rendering it harmless" (Sachs).

Iron is required, though only in minute quantity, to permit of chlorophyll becoming green, and doing its work in the nutrition of plants; but most soils contain a sufficient amount of Iron, and even a small excess is apt to be injurious.

The Saline constituents required by plants may be supplied to any soil in which they are deficient, either by adding such Manures as contain them, or by subjecting the soil to such treatment as will convert insoluble into soluble salts. One of the most important Manures is Kainite, a mineral brought from various localities, including Greenland. It occurs in rock masses, and consists of Potassic Sulphate, Magnesic Sulphate, and Magnesic Chloride, thus supplying several important elements. Other valuable Manures are mentioned above.

SALISBURIA. A synonym of **Ginkgo** (which *see*.)

SALISIA (of Regel). A synonym of **Gloxinia** (which *see*.)

SALISIA (of Lindley). Included under *Kunzea*.

SALIX (the old Latin name used by Virgil, &c.; connected with the Greek *Lelike* and English Sallow). Osier; Sallow; Willow. ORD. *Salicineæ*. An extensive genus (about 160 species are enumerated by Anderson) of mostly hardy trees or shrubs, broadly dispersed. Flowers sessile; catkins often dense, erect, in temperate regions often early, sessile, and naked, in warmer and frigid regions coætaneous, leafy-pedunculate; bracts small, entire or rarely toothed. Leaves often narrow or small, entire or serrulated, penniveined; stipules variable. The wood of the Willows "is soft and light, and is applied

Salix—*continued.*

to a great variety of purposes, especially for building fast-sailing sloops of war, and for making cricket-bats. Split into thin strips, it is manufactured into hats. The twigs have, from the earliest antiquity, been employed in basket-work, and in Pliny's time (as they are, indeed, at present, in the Northern countries of Europe) were twisted into ropes. The leaves of several species are, on the Continent, used as fodder for cattle, being collected in summer and stacked for winter consumption. In Sweden and Norway, the bark is kiln-dried in seasons of scarcity, and is mixed with oatmeal" (Lindley and Moore). The species used for basket-making are commonly called Osiers; those best adapted for wicker-work are *S. triandra* and *S. viminalis*. Many species have been introduced into England, but only the most desirable are described in this work. Willows grow most freely when planted near water, but they succeed almost anywhere in heavy soil and damp situations. Propagated freely by cuttings, made by firm wood of almost any reasonable size.

Fungi. The Fungi parasitic on the various species of Willows are rather numerous, though seldom so hurtful as to seriously injure the trees or shrubs. Hence, it is unnecessary to enter upon a long account of them here, and only a few of the more generally-diffused species will be mentioned.

The leaves of most kinds of Willows are very apt, in summer and autumn, to become covered with small, yellow or orange spots, which, under a good microscope, are found to be composed of groups of rounded, yellow or orange cells, loosely massed together, and surrounded by the torn edges of the epiderm or skin of the leaf. These belong to a Fungus formerly known as *Lecythea caprearum*, and as *Uredo mixta*. The cells are only an early condition of a Fungus named *Melampsora salicina*. In the latter stage, the Fungus occurs in spring, on leaves lying on the ground, in the form of black spots, made up of oblong, dark spores wedged as closely together as they can lie side by side.

Another very common Fungus on Willows assumes the form of a black crust on the leaves and branches. In its young state, it resembles a dark mould, and has been named *Fumago vagans*; but, when mature, it shows elongated perithecia with asci, in which lie six brown, multicellular spores. This mature condition is not frequent.

A third Fungus that attacks Willows belongs to the same group (*Perisporiacei*) as the last, but differs in colour, covering the leaves with a whitish coat (*see* **Mildew** and **Oidium**). This parasite bears the name of *Uncinula adunca*. The whitish coat is formed by the *Oidium* stage. After a time, numerous perithecia are formed on it, at first yellow, but afterwards becoming black, each of which bears on its surface a number of stiff hairs, hooked at the tip. For general structure, *see* references just given.

The leaves of Willows are often spotted by the growth on them of certain Moulds, and of such genera as *Septoria* and its allies, which are generally regarded as young conditions of **Pyrenomycetes** (which *see* for structure); but, beyond rendering the leaves unsightly towards the end of autumn, they do not materially injure the trees. The trunks of old Willow-trees are liable, like almost all other trees, to serious injury from the growth in them of mycelium of some of the larger Fungi, the presence of which is indicated by the appearance, on the exterior of the infected portions of the trunk, of mushrooms, *Polypori*, or other reproductive bodies, varying according to the species of the Fungi. Trees thus infested are not worth preservation, and had better be used as firewood than be left as centres of infection. The Fungi that grow on the leaves are best got clear of by sweeping up and burning all fallen leaves in autumn.

Salix—*continued.*

Insects. Several hundred species of insects are known to feed more or less upon Willows; but only a comparatively small number are so hurtful as to require notice here. Some of the latter are chiefly or wholly associated with the Sallows allied to *Salix Caprea*.

The trunks of Willows are very frequently tenanted by larvæ of *Aromia moschata* (*see* **Musk Beetle**) and of the **Goat Moth** (which *see*), and in some districts the twigs of Osiers suffer much from the burrows of larvæ of the Clearwing Moths, *Sesia formicæformis* and *S. bembeciformis* (*see* **Sesia**). For the proper remedies against these insects, *see* the headings quoted.

Certain species of Sawflies (*e.g.*, *Cryptocampus angustus*, *C. pentandræ*, &c.), one or two Beetles (*e.g.*, *Saperda populnea*), and some Gall-midges (*e.g. Cecidomyia salicina*), produce galls in the form of tapering swellings on the twigs of Osiers; while other species of Gall-midges (*C. rosaria*, &c.) cause the leaves at the tips of the twigs to become crowded into a stunted rosette. These gall-makers can best be reduced in numbers by cutting off the twigs while the galls are still young, and the larvæ too immature to survive the withering of their food.

The leaves are liable to be devoured by **Cockchafers**, by species of **Rhynchites**, and, worst of all, by the Willow-leaf Beetle (*see* **Phratora vitellinæ**). For an account of these insects, *see* the above headings. In some parts of the Fen districts, Osiers have been very much destroyed by the last-named species, but Paris green is now used with success to limit its ravages. Some allied Beetles, of the group *Chrysomelidæ*, may occasionally injure Willows, but are not often sufficiently numerous to require special treatment.

The larvæ of a few Butterflies, of many species of Moths, and of a good many Sawflies, feed, more or less exposed, on the leaves of Willows; but an enumeration of the species is not needed, since their general habits are much alike, and the same treatment is employed to get clear of them, viz., to collect and destroy the creatures, whether by hand-picking, or by shaking the branches over sheets or other surfaces.

The leaves of Willows are very liable to be thickly studded with Sawfly galls, some resembling a small bean in shape, imbedded in the leaf-blade singly or in pairs (the work of *Nematus viminalis*, also known as *N. gallarum*), or like peas in form, attached to the lower surface of the leaf by one side (galls of *N. gallicola*, &c.). These galls often greatly disfigure the leaves, but do not seriously affect the health of the plants. The leaves, if necessary, should be removed, while the galls are young, and allowed to wither. The same method may be made use of against the smaller galls, such as the fleshy tubes of *Cecidomyia marginem-torquens* along the leaf-margins of *S. viminalis*, or the warty galls of various Mites on the surfaces of the leaves, especially on Sallows allied to *S. Caprea*.

The species described below are hardy trees, except where otherwise stated.

S. acutifolia (acute-leaved). A synonym of *S. daphnoides*.

S. alba (white).* White Willow. *fl.*, catkins appearing with the leaves, slender, loose, erect, the scales linear. May. *l.* narrowly lanceolate, long-acuminate, 2in. to 4in. long, silky on both sides, glandular-serrate; petioles eglandular. Trunk 20ft. in girth; bark fissured; twigs silky. *h.* 80ft. Europe (Britain), &c. (Sy. En. B. 1309.)

S. a. cærulea (blue). *l.*, old ones glabrous, glaucous beneath. Twigs olive. (Sy. En. B. 1310.)

S. a. vitellina (yolk-of-egg-coloured). Golden Willow. *fl.*, scales of catkins longer than in the type. *l.*, old ones glabrous above. Twigs yellow or reddish. (Sy. En. B. 1311.)

S. ambigua (ambiguous). A synonym of *S. nigra*.

S. babylonica (Babylonian).* Weeping Willow. *fl.*, catkins nearly 1in. long, sub-coætaneous, few-leaved, very slender, shortly curved; scales ovate-lanceolate. May. *l.* narrow-lanceolate, 3in. to 6in. long, very long and rather obliquely acuminate, serrulated,

Salix—*continued.*

often glaucescent beneath; stipules semi-lunar or obtuse; branches often very loosely and very long-pendulous. Buds very acute. *h.* 30ft. Levant, 1730. (B. F. F. 59.) Syn. *S. pendula*.

S. b. annularis (ringed). This form is peculiar on account of the blade of the leaves being twisted back, so as to form a kind of ring.

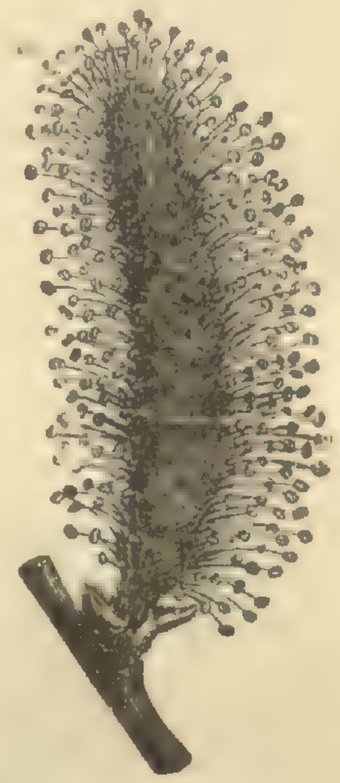

Fig. 403. Male Catkin of Salix Caprea.

S. Caprea (Caprea).* Common Sallow; Goat Willow. *fl.*, catkins silky, preceding the leaves; males 1in. long, very stout; females lengthening to 3in. April and May. *l.* elliptic, oblong-ovate, or oblong-lanceolate, acute or acuminate, cuspidate, 2in. to 4in. long, dark green above, tomentose beneath, the

Fig. 404. Female Catkin of Salix Caprea.

margins narrowly recurved. Europe (Britain). A silvery tree or large shrub, the earliest-flowering of the British Willows. The twigs with catkins, gathered on Palm Sunday, are called Palm-branches. See Figs. 403 and 404. (Sy. En. B. 1331.)

S. C. cinerea (waxy). *fl.*, male catkins less stout than in the type, opening later. *l.* smaller, narrower, from elliptic-oblong to oblanceolate, undulated at the margins, pubescent above. Buds and twigs tomentose. *S. aquatica* and *S. oleifolia* are mere forms of this sub-species.

S. C. pendula (drooping). Kilmarnock Weeping Willow. A variety remarkable for the very decided pendulous character of its branches.

S. daphnoides (Daphne-like). Violet Willow. *fl.*, catkins stout, sessile, clothed with silky hairs, appearing before the leaves; scales black-pointed. April. *l.* narrow-oblong or linear-lanceolate, very acuminate, 3in. to 6in. long, acutely serrated, with persistent, glaucous bloom, shining above. Twigs violet. *h.* 10ft. to 20ft. Europe (naturalised in England). (B. F. F. 62; F. D. 2919.) Syn. *S. acutifolia*.

S. falcata (sickle-shaped). A synonym of *S. nigra falcata*.

S. fragilis (fragile). Crack Willow; Withy. *fl.*, catkins usually spreading, stout, appearing with the leaves; males 1in. to 2in. long; females slender, often longer. April and May. *l.* lanceolate, long-acuminate, 3in. to 6in. long, glabrous, glandularly serrated, pale or glaucous beneath, the young ones hairy. Trunk sometimes 20ft. in girth; branches spreading obliquely; twigs yellow-brown, very fragile at the junction, polished. *h.* 80ft.

Salix—*continued.*

to 90ft. Europe (Britain). See Fig. 405. (Sy. En. B. 1306.) *S. decipiens* is a variety with smaller leaves, and orange or crimson twigs.

FIG. 405. BRANCHLET, WITH FEMALE CATKINS, OF SALIX FRAGILIS.

S. lucida (shining). *fl.*, catkins pedunculate, borne on the summit of lateral, leafy branches of the season; scales greenish-yellow, more or less hairy. May and June. *l.* ovate-oblong or lanceolate and narrow, usually with a long, tapering point, smooth and shining on both sides, serrated; stipules oblong and toothed. Branches very brittle at the base. North America. A beautiful species, sometimes flowering at a height of 3ft., sometimes becoming a small, bushy tree of 12ft. to 15ft. (T. S. M. 310.)

S. nigra (black). *fl.*, catkins similar to those of *S. lucida*; scales short and rounded, woolly. May and June. *l.* narrow-lanceolate, pointed and tapering at each end, serrated, smooth (except on the petiole and midrib) and green on both sides; stipules small, deciduous. Branches very brittle at base; bark rough and black. *h.* 15ft. to 25ft. North America. (T. S. M. 307.) SYN. *S. ambigua.*

S. n. falcata (sickle-shaped). *l.* elongated-falcate; stipules large, broadly lunate, reflexed. SYNS. *S. falcata, S. Purshiana.*

S. pendula (drooping). A synonym of *S. babylonica.*

FIG. 406. BRANCHLET, WITH MALE CATKIN, OF SALIX PENTANDRA.

S. pentandra (five-stamened). Bay-leaved Willow. *fl.*, catkins shortly pedunculate; males 1in. to 2in. long, erect, at length

Salix—*continued.*

pendulous; stamens five; females shorter; scales pale. May and June. *l.* elliptic or ovate- or obovate-lanceolate, acuminate, 1in. to 4in. long, glandularly serrulated, fragrant, viscid, shining, paler and reticulated beneath; stipules ovate-oblong or absent. Bark brown. Europe (Britain). A shrub 6ft. to 8ft., or tree 20ft. high. The latest-flowering Willow. See Fig. 406. (Sy. En. B. 1303.) *S. cuspidata* is probably a hybrid between this species and *S. fragilis.*

S. phylicifolia (Phylica-leaved).* Tea-leaved Willow. *fl.*, catkins sessile, bracteate; scales linear-oblong, acute, black. April and May. *l.* ovate-oblong or elliptic-lanceolate, quite glabrous, shining above, glaucous beneath; stipules very small or absent. *h.* 10ft. Europe (Britain). A very handsome large bush or small tree; when fully developed, it is conspicuous from its spreading, shining, chestnut or reddish branches, and glistening green and glaucous foliage. *S. nigricans* is closely related to this species. The following British forms have been described as species: (1) Erect, with silky capsules, *S. Croweana, S. Davalliana, S. Dicksoniana, S. nitens, S. tenuior, S. Weigeliana.* (2) Erect, with glabrous or nearly glabrous capsules, *S. Borreriana, S. laxiflora, S. phillyreæfolia, S. propinqua, S. tenuifolia, S. tetrapla.* (3) More or less decumbent and rooting, with silky capsules, *S. radicans.* (Sy. En. B. 1334 to 1346.) *S. laurina*, a small, handsome tree, 20ft. to 30ft. high, is probably a hybrid between *S. phylicifolia* and *S. Caprea.*

FIG. 407. TWIG BEARING MALE CATKINS, AND LEAF, OF SALIX VIMINALIS.

S. purpurea (purple). Purple Osier. *fl.*, catkins sub-sessile, ⅜in. to 1½in. long, opposite or alternate, erect, then spreading or recurved, cylindric; scales purple-black above. March and April. *l.* often sub-opposite, thin, linear-lanceolate, serrulated, glabrous, 3in. to 6in. long, sparingly hairy when young, shortly petiolate. Bark red or purple. *h.* 5ft. to 10ft. Europe (Britain). An erect or decumbent shrub. *S. Lambertiana, S. ramulosa*, and *S. Woolgariana* are varieties. (Sy. En. B. 1316-1319.) *S. Doniana* and *S. Pontederana* are hybrids between this species and, respectively, *S. repens* and *S. cinerea.*

S. Purshiana (Pursh's). A synonym of *S. nigra falcata.*

S. rubra (red). *fl.*, filaments usually more or less free. *l.* silky beneath. A common and very variable Osier-bed shrub, the result of a cross between *S. purpurea* and *S. viminalis.* (Sy. En. B. 1320.) The following is a form:

S. r. Helix (Helix). Rose Willow. *fl.*, filaments united at the top. *l.* sub-opposite. This plant bears fascicles of diseased leaves, owing to the punctures of a Cynips; hence the common name.

S. Russelliana (Russell's). A synonym of *S. viridis.*

S. triandra (three-stamened). Almond-leaved or French Willow. *fl.*, catkins shortly pedunculate, 1in. to 2in. long, slender, appearing with the leaves, the females narrow; stamens three. April to June. *l.* linear- or oblong-lanceolate, acuminate, glandularly

Salix—*continued.*

serrated, 2in. to 4in. long, glabrous, glaucous beneath; stipules large, semi-cordate. Bark flaking. Twigs terete. *h.* 20ft. Arctic Europe (Britain) and North Asia. (Sy. En. B. 1313.) SYN. *S. Villarsiana.* The following varieties were formerly regarded as distinct species:

S. t. amygdalina (Almond-like). *l.* rounded at the broad base, glaucous beneath. Twigs furrowed.

S. t. Hoffmanniana (Hoffmann's). *l.* broader at base than in the type, green beneath. Twigs terete.

S. Villarsiana (Villars'). A synonym of *S. triandra.*

S. viminalis (twiggy). Osier. *fl.*, catkins golden-yellow, sessile, ¾in. to 1in. long, opening long before the leaves; scales brown, oblong. April to June. *l.* linear-lanceolate, acuminate, 4in. to 10in. long, narrowed into the petioles, reticulated above, silvery-silky beneath, the margins revolute, quite entire. Branches long and straight, the young ones silky, the adults polished. *h.* 30ft. Europe (Britain). Shrub or small tree. See Fig. 407. (Sy. En. B. 1322.) *S. Smithiana* and *S. stipularis* are supposed to be hybrids between this species and *S. Caprea* or, in the latter, *S. cinerea.* Both closely resemble *S. viminalis.*

S. viridis (green). *fl.*, catkins on short, leafy, lateral branches, spreading or recurved, cylindrical, dense in flower, lax in fruit. May and June. *l.* narrowly lanceolate-elliptic, attenuated at base and long-acuminate at apex, or equally attenuated at each end, glandular-serrated, glabrous on both sides when mature; young ones silky. Young branches downy. *h.* 30ft. Europe (Britain). (Sy. En. B. 1808.) SYN. *S. Russelliana.*

SALLOW. A common name for several species of *Salix*, notably *S. Caprea.*

SALLOW THORN. *See* **Hippophae.**

SALMEA (named in honour of Prince Charles of Salm-Dyck, in Holland, an enthusiastic cultivator of plants). SYN. *Hopkirkia.* ORD. *Compositæ.* A genus comprising about a dozen species of erect, sarmentose, or climbing, stove shrubs, inhabiting Mexico and the West Indies. Flower-heads white, rather small, discoid; involucre short, turbinate or campanulate, the bracts few-seriate, imbricated; receptacle conical or elongated; achenes laterally compressed; cymes corymbose, forming a pyramidal panicle at the tips of the branches. Leaves opposite, petiolate, entire or toothed. The two species described below are pretty plants, and thrive in a light, rich soil. They may be readily increased by cuttings of the young wood, inserted in sand, under a glass, in heat.

S. hirsuta (hairy). *fl.-heads* ternately sub-sessile, oblong, in trichotomous corymbs; involucre two or three-seriate. August. *l.* 3in. to 5in. long, ovate or oblong-lanceolate, acuminate, denticulate-repand or sub-entire, scabrous-hispidulous above, villous-tomentose beneath. Branches villous-pubescent. Jamaica, 1823. Trailer.

S. scandens (climbing). *fl.-heads* hemispherical. June. *l.* ovate, acuminate, sub-entire, glabrous. Stem climbing, and, as well as the branches, smooth towards the apex. *h.* 6ft. Vera Cruz, 1820. (B. M. 2062.)

SALMIA (of Cavanilles). A synonym of **Sanseviera** (which *see.*)

SALMIA (of Willdenow). A synonym of **Carludovica** (which *see*).

SALMON BERRY. *See* **Rubus spectabilis.**

SALPICHLÆNA. Included under *Blechnum.*

SALPICHROA (from *salpinx*, a tube, and *chroos*, skin; alluding to the form and texture of the flowers). SYNS. *Busbeckea, Salpichroma.* ORD. *Solanaceæ.* A genus consisting of about ten species of stove or greenhouse herbs, sub-shrubs or shrubs, natives of extra-tropical South America or the Andes. Flowers white or yellow, sometimes 2in. to 3in. long; calyx five-fid or five-parted; corolla long, tubular or urceolate, the lobes five, acute, induplicate-valvate, often short, erect or spreading; stamens affixed above the middle of the tube; pedicels solitary. Leaves entire, rather long-petiolate, often rather small. *S. glandulosa*, the only species introduced, is a stove shrub, requiring culture similar to **Juanulloa** (which *see*).

S. glandulosa (glandular). *fl.* yellow; corolla eighteen to nineteen lines long, the throat nearly ½in. in diameter; peduncles filiform, nodding at apex. July. *l.* twin, long-petiolate, cordate-ovate, seven to eleven lines long, glandular-pubescent, often hoary-tomentose. Stem sub-erect, much branched. *h.* 2ft. Chili, 1844.

SALPICHROMA. A synonym of **Salpichroa** (which *see*).

SALPIGLOSSIS (from *salpinx*, a tube, and *glossis*, a tongue; in allusion to the tongue-like style in the mouth of the corolla). ORD. *Solanaceæ.* A small genus (two or three closely-related species) of greenhouse or hardy, annual, biennial, or perennial, viscous-pubescent herbs, natives of Chili. Flowers few, rather long-pedicellate, often rather large; calyx tubular, five-fid; corolla obliquely funnel-shaped, the throat ample, campanulate; lobes five, plicate, emarginate, erecto-patent; perfect stamens four, included. Leaves entire, sinuate-toothed, or pinnatifid. *S. sinuata*, the species known in gardens, is a very ornamental and useful border plant; it requires culture similar to **Schizanthus** (which *see*).

S. integrifolia (entire-leaved). A synonym of *Petunia violacea*

S. linearis (lined). A synonym of *Petunia intermedia.*

FIG. 408. UPPER PORTION OF PLANT OF SALPIGLOSSIS SINUATA.

S. sinuata (wavy).* Scalloped Tube-tongue. *fl.* dark purple, straw-coloured, or variously painted, often striped, showy; corolla usually 1½in. long. Summer. *l.*, lower ones petiolate, elliptic-oblong, sinuate-toothed or pinnatifid; upper ones more entire; bracts sessile, quite entire. *h.* 2ft. 1820. A sub-erect, branched, viscous-pubescent, greenhouse or hardy annual. See Fig. 408. It is known in gardens by the following names: *S. atropurpurea* (B. M. 2311; B. R. 1518; S. B. F. G. 271), *S. Barclayana* (S. B. F. G. ser. ii. 112), *S. picta* (B. M. 3365; L. B. C. 1652; S. B. F. G. 258), and *S. straminea* (H. E. F. 229; S. B. F. G. 231). There are several garden varieties, including *coccinea* (L. & P. F. G. iii. 100) and *flava* (G. M. B. i. p. 57).

SALPIXANTHA. A synonym of **Geissomeria** (which *see*).

SALSAFY (*Tragopogon porrifolium*). A hardy biennial, cultivated for the use of its long, white, fleshy roots, which are cooked and served in various ways. It re-

Salsafy—*continued.*

quires an open situation and deep soil, but the latter should not be newly manured for the crop, as this tends to make the roots forked. Seeds may be sown at the end of March, or any time during April, in drills 1ft. apart, and the plants thinned, when large enough, to 9in.

FIG. 409. SALSAFY.

asunder in the rows. The roots (see Fig. 409) will be ready for use from October through the winter. A supply should be lifted before severe frost sets in, and stored in sand, in a cool shed. Salsafy is not usually required in large quantities.

SALSOLA (a diminutive from *salsus*, salted; alluding to the salty soil in which the plant is found). Alicant Soda; Saltwort. ORD. *Chenopodiaceæ.* A genus comprising about forty species of mostly hardy herbs, shrubs, or sub-shrubs, of variable habit, mainly natives of saline districts in temperate regions. The ashes of *S. Kali*, the Prickly Saltwort, a British plant, and of *S. Soda*, a South European and North American species, were formerly much used in the production of an impure carbonate of soda, known as Barilla (*see* remarks under **Salicornia**). The species have no horticultural value.

SALSOLACEÆ. Included under *Chenopodiaceæ.*

SALT. A general term used by chemists to signify compounds formed by the union of an acid with a metal, or with some other substance of similar chemical powers, and known as a base. For example, Sodium Carbonate is made up of Carbonic Acid, and of the metallic base

Salt—*continued.*

Sodium. So Ammonium Nitrate consists of Nitric Acid united with the base Ammonium. But the word "Salt" is often used by itself, or in the expression "Common Salt," to denote Sodium Chloride, the substance so familiar to everyone, and so essential as a part of our daily food. As the name Sodium Chloride denotes, it is composed of Sodium and Chlorine, there being in it one equivalent of each, or 23 parts of Sodium to 35½ of Chlorine by weight. Both elements have been found to occur in the ashes of all plants, and in special abundance in those of maritime districts. There is great doubt as to the use of each element, since experiments tend to show that neither is absolutely essential to any plant. Yet common Salt has long been used as a manure, and there is a very general belief among agriculturists that it is valuable in strengthening Cereals, and increasing the yield from them, and also in destroying noxious insects and weeds. Experiments on its use have afforded no very definite results. Dr. Voelcker found that it rather lessened the yield of straw, and had no appreciable effect on the grain, and that it restrained any tendency to rank growth. He also found that, when supplied to Mangel-Wurzel, it increased the weight of the crop. It is able to bring nitrogenous substances in the soil, and in farmyard and artificial manures, into a condition suited for being absorbed by plants; hence, it is probably of use in this way. It has been observed that it produces markedly useful results when supplied along with nitrogenous manures. There is usually no need to supply Salt to soils on the sea-coast, as they are already supplied from the sea by spray. The refuse Salt of the fish or ham-curer is the cheapest and most suitable form in which to employ Salt as manure.

SALTPETRE (*Nitrate of Potassium*). A substance found in quantities as a natural product in Hindostan, and also much prepared artificially from heaps of organic remains allowed to decay in contact with Carbonate of Potassium. Its high price renders the use of it as manure impracticable, despite the good results that have attended its employment in experimental farming. Its value is due to its supplying both Potassium and Nitrogen in a form readily available to plants. Its place as a manure, in commerce, is supplied, in so far as yielding nitrogenous food, by Nitrate of Sodium, which is found in very extensive beds in South America, and can be sold, after being freed of excess of earthy substances, at a sufficiently low price to permit of its profitable employment by farmers. Saltpetre increases the yield of Cereals, and of Clover and other leguminous plants, and seems peculiarly to promote the growth of the green parts.

SALT-TREE. A name applied to several species of *Halimodendron.*

SALTWORT. *See* **Salsola.**

SALTWORT, BLACK. A common name for **Glaux** (which *see*).

SALVADORA (named after J. Salvador, a Spanish botanist). ORD. *Salvadoraceæ.* A small genus (two or three species) of stove, evergreen shrubs or trees, natives of East Africa, Arabia, and India. Flowers small, racemose or spicate, on the branches of terminal or axillary panicles; calyx lobes four, imbricated; corolla campanulate, the tube with four small teeth between the bases of the filaments, the lobes four, imbricated; stamens four. Leaves opposite, entire, rather thick, often pale. *S. persica*, the only species introduced, is supposed, by many authorities, to be the Mustard-tree of Scripture (Matt. xiii. 32). It thrives in well-drained loam, and may be increased by cuttings, inserted in sand, under a glass, in heat.

Salvadora—*continued.*

S. indica (Indian). A synonym of *S. persica.*

S. persica (Persian). Kiknel Oil-plant. *fl.* white, pedicellate, scattered; panicles 2in. to 5in. long, often very compound, numerous in the upper axils. June. *l.* ovate or oblong, obtuse, 1¾in. long. Arabia, India, &c., 1850. A small, glabrous tree. (B. F. S. 247, under name of *S. Wightiana.*) SYN. *S. indica.*

SALVADORACEÆ. A small natural order of glabrous or scarcely powdery, unarmed or spiny trees or shrubs, natives of tropical and sub-tropical, mostly Western Asia, Africa, and the Mascarene Islands. Flowers hermaphrodite or dicœcious, regular, forming a trichotomously-paniculate inflorescence; calyx free, campanulate or ovoid, three or four-toothed or four-fid; corolla gamopetalous and campanulate, or polypetalous, the lobes or petals four, imbricated in æstivation; stamens four, alternating with the lobes or petals, the filaments filiform or dilated at base; anthers two-celled; panicles short, axillary, often reduced to dense, sessile fascicles. Berries fleshy or sub-drupaceous, indehiscent, usually one-seeded. Leaves opposite, entire. *Salvadora persica* bears edible berries; the bark of the root contains acrid and vesicant properties, and that of the stem is a tonic. The order comprises three genera—*Azima*, *Dobera*, and *Salvadora*—and only eight or nine species.

SALVIA (the old Latin name, used by Pliny, from *salveo*, to save or heal; indicative of the supposed medicinal qualities of some of the species). Sage. Including *Sclarea.* ORD. *Labiatæ.* A vast genus (nearly 450 species have been described) of stove, greenhouse, or hardy, annual, biennial, or perennial herbs, sub-shrubs, or shrubs, of variable habit, broadly dispersed over the temperate and warmer regions of the globe. Flowers variable in colour, rarely yellow, mostly showy, sessile or shortly pedicellate; calyx ovoid, tubular, or campanulate, bilabiate, the upper lip entire or with three minute teeth, the lower one bifid; corolla tube included or exserted, equal, swollen, or enlarged above, the limb bilabiate; upper lip erect, concave or arched, entire or scarcely notched; lower one spreading, three-lobed, the middle lobe often notched or divided; perfect stamens two; whorls two to many-flowered, variously spicate, racemose, or paniculate, or rarely all axillary. Nutlets ovoid, triquetrous or slightly compressed, smooth. Leaves entire, toothed, incised, or pinnatisect; floral ones often changed into bracts; cauline ones rarely conformed. A large number of the species have been introduced; a selection of the most desirable kinds is given below. Two species—*S. pratensis* and *S. Verbenaca*—are indigenous to Britain. *S. officinalis* is the well-known common Sage, much used in cooking. Salvias may readily be raised from seeds; when these can be obtained, they should be sown thinly, and placed in a little warmth. Cuttings of the tender species and varieties root very readily in heat, if they are quite soft, and in a growing state. As greenhouse plants for autumn and winter-flowering, some of the Salvias are very showy and useful. Amongst them may be specially mentioned: *S. azurea* (var. *grandiflora*), *S. cacalæfolia*, *S. involucrata* (var. *Bethellii*), *S. rutilans*, *S. splendens* (and its variety *Bruantii*). For spring-flowering, *S. boliviana*, *S. fulgens*, and *S. gesneræflora*, are amongst the best. *S. patens* is one of the most distinct and beautiful of deep blue-flowered plants in cultivation, and is equally well suited for greenhouse decoration in summer, or for planting in beds outside, to flower at the same season. Salvias like a rich soil, particularly when grown in pots; loam and manure, in about equal parts, is not too strong for them. The plants may be grown outside during summer, but they must be housed before frost appears, as they cannot withstand severe weather. Salvias are not well adapted for room decoration: under such treatment, their flowers very soon drop. The plants should be propagated, for all purposes, in spring and early summer; and, in most cases, it is advisable

Salvia—*continued.*

to raise some new ones each year. Except where otherwise stated, the species described below are hardy, herbaceous perennials.

S. albo-cærulea (white and blue).* *fl.*, calyx campanulate-tubular, glandular-pubescent; corolla white, the lower lip intense indigo, 1in. or more in length, showy; whorls four to many-flowered; raceme simple, 6in. to 12in. long. Summer. *l.* petiolate, oblong-lanceolate, long-acuminate, 4in. to 6in. long, crenate-serrate, decurrent into the petioles, nearly glabrous above, softly pubescent beneath. Stems erect. *h.* 3ft. Mexico. Greenhouse sub-shrub. (F. d. S. 1340; R. G. 221.)

S. amarissima (very bitter). *fl.* blue; calyx pilose-hispid; corolla nearly thrice as long as the calyx; whorls distinct, rather remote, about ten-flowered; racemes 3in. to 6in. long, simple, dense-flowered. August. *l.* petiolate, ovate-cordate, crenate, 1½in. long, wrinkled above, pale or canescent beneath. Stem erect, branched, 2ft. high, pilose-hispid. Mexico, 1803. Greenhouse perennial. (B. R. 347.)

S. angustifolia (narrow-leaved). *fl.* very shortly pedicellate; calyx lips half the length of the tube; corolla blue, the lower lip as wide as long, the middle lobe emarginate or undulate; inflorescence twiggy, slender, of distant, few-flowered clusters. May. *l.* linear, 1½in. to 3in. long, entire or obscurely denticulate, acute, somewhat petioled. *h.* 2ft. Mexico, 1816. Greenhouse perennial. (B. R. 1554; S. B. F. G. ser. ii. 219.)

S. argentea (silvery). *fl.*, calyx sessile, eight to nine lines long; corolla pinkish-white, showy, nearly three times as long as the calyx; whorls six to ten-flowered, remote; panicle ample, but slightly branched. June. *l.*, radical ones petiolate, lower cauline ones sessile, 6in. to 8in. long, cuneate at base, sinuate-lobed, erose, woolly, wrinkled, white-veined; floral ones very broad, acuminate, concave, persistent, pilose. Stem erect, villous. *h.* 3ft. Mediterranean region, 1759. Biennial. (S. F. G. i. 27.)

S. asperata (rough).* *fl.* white; calyx campanulate, hispid-ciliate; corolla tube equalling the calyx, the hood falcate and compressed; whorls distant, six to ten-flowered; racemes slightly branched. July. *l.* petiolate, broadly sub-cordate-ovate, shortly acuminate, erose-crenate, much wrinkled, villous, scarcely canescent beneath; cauline ones broad, acuminate, mostly longer than the calyx. Stem glandular-pubescent and pilose. *h.* 2ft. Cashmere, 1854. (B. M. 4884.)

S. aurea (golden). *fl.*, calyx ½in. long, campanulate, villous; corolla of a beautiful golden-colour, thrice as long as the calyx, the hood large, slightly falcate and compressed; whorls two-flowered, scarcely distinct; racemes dense, 2in. to 4in. long. July. *l.* ½in. or scarcely 1in. long, petiolate, somewhat ovate-rotundate, obtuse, entire or sinuate, hoary; floral ones sessile, villous, persistent. Branches hoary-tomentose. *h.* 3ft. or more. Cape of Good Hope, 1731. Greenhouse shrub. (B. M. 182.)

S. austriaca (Austrian). *fl.*, calyx nearly ½in. long, very villous; corolla yellowish-white, thrice as long as the calyx, the tube slightly exserted, the upper lip falcate; whorls nearly six-flowered, the lower ones distant, the upper ones approximating; racemes slightly branched. June. *l.*, radical ones 3in. to 4in. long, petiolate, broadly ovate, entire or erose-toothed, cordate, rounded, or cuneate at base, wrinkled above, pubescent beneath; cauline ones one or two pairs, sessile 2in. long; floral ones five lines long, ovate, acuminate. Stem erect, 2ft. to 3ft. high, nearly simple. Austria, 1776. (B. R. 1019; J. F. A. 112.)

S. azurea (azure-blue). *fl.*, calyx oblong-campanulate, obscurely bilabiate; corolla deep blue, sometimes varying to white, the lower lip sinuately three-lobed and emarginate; pedicels short; inflorescence spike-formed. August. *l.*, lower ones lanceolate or oblong, obtuse, denticulate or serrate, tapering into a slight petiole; upper ones narrower, often linear, entire; floral ones or bracts subulate, somewhat persistent. *h.* 6ft. North America, 1806. Plant glabrous or puberulous. (B. M. 1728.)

S. a. grandiflora (large-flowered). *fl.*, calyx tomentulose-sericeous; inflorescence denser than in the type. Plant cinereous-puberulous. SYN. *S. Pitcheri* (F. M. n. s., 455; G. C. n. s., xiv. 685).

S. Bethellii (Bethell's). A garden variety of *S. involucrata.*

S. bicolor (two-coloured).* *fl.*, calyx four to five lines long, glutinous-hispid, with subulate-acuminate teeth; corolla thrice as long as the calyx, the upper lip bluish-violet, golden-dotted, the lower one whitish; whorls six-flowered, distinct; racemes 1½ft. to 2ft. long, many-flowered. June. *l.*, lower ones petiolate, ample, ovate, incised-toothed, pinnatifid or palmately lobed; middle ones petiolate, ovate-lanceolate; upper ones sessile; all cordate at base, and glutinous-pubescent. Stem thick, 2ft. to 3ft. high, scarcely branched. Barbary, 1793. A very pretty and distinct, hardy biennial. (B. M. 1774; P. M. B. ix. 271.)

S. boliviana (Bolivian).* *fl.* many in a whorl; calyx ¾in. long, dull purple or green and purple; corolla bright scarlet, 3in. long, slightly curved, glabrous, the upper lip very small, the lower shortly three-lobed; panicle sub-sessile, 2ft. high, branched. Autumn. *l.* 3in. to 6in. long, ovate-cordate, acute, wrinkled; petioles slender, 1in. to 3in. long. *h.* 4ft. Bolivia, 1856. Greenhouse under-shrub. (B. M. 6714; F. d. S. 1148.)

Salvia—*continued.*

S. cacaliæfolia (Cacalia-leaved).* *fl.*, calyx campanulate, the teeth aristate-acuminate; corolla deep blue, many times longer than the calyx, having a very broad tube; whorls two-flowered; racemes branched. June. *l.* petiolate, broadly deltoid, broadly sub-hastate-cordate at base, rather thick, pubescent above, reddish or whitish and softly villous beneath. Stem erect, pubescent. *h.* 3ft. Mexico, 1858. Greenhouse perennial. (B. H. 1862, 100; B. M. 5274; F. d. S. 2318.)

S. Camertoni (Camerton's). *fl.* brownish-purple; calyx softly glandular-pilose; corolla 1in. long, the tube slightly curved. Summer. *l.* petiolate, ovate or cordate-ovate, acuminate, rounded at base, 1in. to 1½in. long, crenate-serrated, ciliated, shortly hispid above, paler and glabrous beneath. Stem 3ft. to 5ft. high, sub-shrubby. Probably Mexico. (R. G. 125.)

S. Candelabrum (candelabrum-like).* *fl.*, calyx sharply ribbed, tinged with purple; corolla white, and striated with pale purple, thrice as long as the calyx, externally hairy; lower lip deep rich violet, variegated and streaked with white at the throat; panicle terminal, erect, the branches spreading, each bearing a cyme of several flowers. July. *l.* oblong-lanceolate, rather obtuse, 3in. to 4in. long, crenulate, very loosely wrinkled, hairy, glandular-dotted. Stem erect, 3ft. to 4ft. high. Mexico, 1845. Half-hardy sub-shrub, exhaling a powerful aromatic odour. (B. M. 5017; F. d. S. 1344; L. & P. F. G. ii. p. 161, 217.)

S. canescens (hoary). *fl.*, calyx tubular-campanulate; corolla purple, nearly thrice as long as the calyx, the tube shortly exserted, the upper lip slightly falcate; whorls remote; racemes branched, villous-viscous. July. *l.* lanceolate-oblong, entire or sinuate-lobed, long-narrowed at base, wrinkled, above loosely, below densely, white-woolly; floral ones very broad, acuminate, concave, persistent, rather shorter than the calyx. Stem 2ft. high, white-woolly at base. Caucasus. (B. R. 1838, 36.)

S. carduacea (Thistle-leaved).* *fl.*, calyx long-woolly; corolla lavender-coloured, 1in. long, its tube slightly exserted; upper lip erose-toothed or fimbriated and two-cleft; lower one with small, lateral, erose lobes, and a larger, flabelliform, deeply multifid middle one. July. *l.* oblong, sinuately-pinnatifid, Thistle-like. Stem stout, simple, 1ft. or more high, naked and scape-like, only at base subtended by a cluster of leaves. California, 1854. (B. M. 4874.)

S. chamædryoides (Chamædrys-like).* *fl.* geminate or few in the clusters of the raceme; calyx cylindrical-campanulate, ⅓in. long; corolla blue, upwards of ½in. long, the middle lobe of the lower lip broader than long, obcordate-lobed. July. *l.* rather thick, oblong or elliptical, on short petioles, more or less crenulate, obtuse, less than 1in. long; floral ones bract-like, caducous. *h.* 1ft. Mexico, 1795. A much-branched, canescent and scabrous, greenhouse shrub. (B. M. 808; L. B. C. 576; A. B. R. 416, under name of *S. chamædrifolia.*)

S. coccinea (scarlet).* *fl.*, calyx lips half the length of the tube; corolla deep scarlet, 1in. or less long, pubescent or puberulous outside, the lower lip twice the length of the upper; raceme twiggy, the clusters few or several-flowered, and rather distant. July. *l.* membranous, veiny, cordate or ovate, mostly acute, crenate, slender-petioled, mostly soft-tomentose beneath. *h.* 2ft. Central and South America, &c., 1772. A greenhouse or half-hardy annual or perennial, canescently pubescent or glabrous, or hairy towards the base.

S. c. major (larger). A tall-growing form, with somewhat larger flowers than those of the type. (B. H. ix. p. 65; R. G. vii. 232.)

S. c. pseudo-coccinea (false-coccinea). A commonly tall form, with stem, petioles, and often floral leaves, conspicuously hirsute. (B. M. 2864, under name of *S. pseudo-coccinea.*)

S. cœlestina (celestial-blue). *fl.* very numerous; corolla of a soft lilac-blue. Summer. *l.* petiolate, oval-elliptic, shortly and broadly rounded at the base, attenuated at the apex, irregularly toothed on the margins. *h.* 2ft. Mexico (?), 1878. Plant whitish-green or incanescent. A very floriferous, greenhouse perennial, of robust habit.

S. colorans (coloured). A garden synonym of *S. splendens.*

S. Columbariæ (Scabious-like). *fl.* small; calyx naked within; corolla blue, hardly exceeding the calyx, its upper lip emarginately bilobed at apex, the lower with small lateral lobes and a much larger, somewhat bilobed middle one; heads many-flowered. Summer. *l.* deeply once or twice pinnatifid, or pinnately parted into oblong, crenately-toothed or incised, obtuse divisions, muticous, wrinkled; involucral floral ones broadly ovate, entire. Stem slender, 6in. to 20in. high, one or two-headed. California. Half-hardy annual. (B. M. 6595.)

S. confertiflora (clustered-flowered).* *fl.*, calyx reddish, ovate-tubular, tomentose, woolly; corolla reddish within, yellowish or reddish outside, clothed with golden wool, half as long again as the calyx; whorls numerous, ten to twenty-flowered; racemes upwards of 1ft. long. August. *l.* petiolate, ovate-oblong, 3in. to 4in. long, slightly acute, crenate, somewhat decurrent, wrinkled and appressedly pubescent above, densely rufous-tomentose beneath; cauline ones ovate, short. Branches rufous-tomentose. *h.* 3ft. Rio Janeiro and Organ Mountains, 1838. Greenhouse sub-shrub. (B. M. 3899; B. R. 1839, 29.)

S. confusa (confused). *fl.*, calyx coloured, striated, pubescent, the teeth all subulate-acuminate; corolla whitish, twice or thrice as long as the calyx; whorls remote, many-flowered; racemes elongated. July. *l.* petiolate, mostly interruptedly pinnatisect, wrinkled, whiter below than in *S. interrupta*; terminal segment large, oblong-lanceolate, narrowed at base; lateral ones one or two on each side. Stem slightly woolly at base. *h.* 4ft. South Europe, 1790. Hardy shrub. SYN. *S. interrupta* (S. B. F. G. 169).

S. dichroa (two-coloured). *fl.*, calyx ⅜in. long; corolla 1¼in. long, the upper lip bright blue, pubescent, arcuate, the lateral lobes of the lower lip pale blue, recurved, the mid-lobe white, pendulous; racemes 1ft. or more long, many-flowered. August. *l.*, radical ones petiolate, 6in. to 8in. long, oblong-ovate or ovate-lanceolate, obtuse, narrowed into the petiole, sinuate-serrate, with rounded lobules, pubescent; upper cauline ones sessile. Stem 2ft. to 3ft. high. Greater Atlas, 1871. Plant glandular-pubescent. (B. M. 6004.)

S. discolor (discoloured).* *fl.* in long, terminal spikes; tubular part of the corolla dark purple, almost wholly hidden by the calyx; projecting lips of a violet-black colour. *l.* entire, ovate-oblong, on rather long petioles, nearly 6in. long. *h.* 2ft. to 3ft. or more. Andes of Peru, 1883. (B. M. 6772; G. C. n. s., xix. p. 341, under name of *S. mexicana minor.*)

S. elegans (elegant). *fl.* shortly pedicellate; calyx campanulate, glandular-villous; corolla blood-colour, above 1in. long (nearly six times the length of the calyx); whorls remote, about six-flowered; racemes 4in. to 6in. or more long. Summer. *l.* petiolate, ovate, 1in. to 1½in. long, acuminate, serrate, rounded or narrowed at base, slightly hispid, pubescent, or tomentose above, glabrous beneath; floral ones sessile. Stem 3ft. to 4ft. high, glabrous or scarcely pilose. Mexico and Guatemala. Greenhouse perennial. (B. M. 6448; Ref. B. 228.)

S. farinacea (mealy). *fl.*, calyx densely white-tomentose, often tinged with violet; lower lip of the violet-blue corolla with middle division obcordately two-lobed; inflorescence spike-formed, on a long, naked, interrupted peduncle, of densely many-flowered clusters. Summer. *l.*, lower ones ovate-lanceolate or ovate, obtuse cuneate or rarely subcordate at base, serrate, on slender petioles; upper ones lanceolate or linear-lanceolate, sometimes entire; floral ones subulate or ovate-lanceolate. Stems numerous, in a cluster. *h.* 3ft. Texas, 1847. (R. G. 1002; R. H. 1873, 91.)

S. Forskolei (Forskohl's). *fl.*, calyx four to five lines long, tubular, often coloured at apex, viscous-pubescent; corolla violet, thrice as long as the calyx, the tube nearly straight or recurved, the upper lip emarginate-bifid; whorls at length 1in. or more apart, usually two, rarely four to six-flowered; racemes elongated, nearly simple. July. *l.*, lower ones petiolate, 3in. to 4in. long, ovate, repand-crenate, auricled or lobed at base, villous; cauline ones few, sub-sessile, much shorter than the calyx. Stem 1½ft. high, leafy at base. Orient, 1800. (B. M. 988; S. F. G. 21.)

S. fulgens (brilliant).* *fl.* showy; calyx six to eight lines long, tubular-campanulate; corolla scarlet, nearly 2in. long, villous, the tube exserted and swollen; whorls six-flowered, nearly 1in. apart; racemes 6in. to 12in. long. July. *l.* petiolate, ovate, acute, usually 1in. to 3in. long, crenate-serrate, cordate at base, pubescent above, white-tomentose or woolly beneath. Stem 2ft. to 3ft. or more high; branches numerous. Mexican Mountains, 1829. Greenhouse shrub. (B. R. 1356; L. B. C. 1910 S. B. F. G. ser. ii. 59.)

FIG. 410. FLOWER OF SALVIA GESNERÆFLORA.

S. gesneræflora (Gesnera-flowered).* This magnificent garden species has quite the habit of *S. fulgens*; but the flowers are far more abundant and conspicuous, the upper lip of the corolla is flatter and less shaggy, the tube is longer, and the style is less feathery. *h.* 2ft. Columbia, 1840. Greenhouse herbaceous perennial. See Fig. 410. (F. d. S. 2131; I. H. i. 32; L. & P. F. G. 47.)

S. glutinosa (glutinous). Jupiter's Distaff. *fl.*, calyx tubular, one-third the length of the corolla; corolla pale yellow, often 1¼in. long, with an exserted tube and an enlarged throat; whorls distant, loosely few-flowered. July. *l.* petiolate, ovate-oblong, acuminate, cordate-sagittate at base; lower ones often 7in. to 8in. long, the upper ones smaller; floral ones ovate, acuminate, shorter than the calyx. Stem erect, glutinous, pilose. *h.* 3ft. Europe and Central Asia, 1759. (S. B. F. G. 140, under name of *S. nubicola.*)

Salvia—*continued.*

S. Goudotii (Goudot's).* *fl.*, calyx tubular-campanulate, three to four lines long; corolla bright crimson, upwards of 1in. long, the tube long-exserted and enlarged above, the lips sub-equal; whorls six to ten-flowered, sub-secund; racemes simple, 6in. long. Summer. *l.* ovate or ovate-lanceolate, acuminate, nearly 3in. long, crenate-serrate, narrowed at base, pubescent. Branchlets rufous-puberulous or glabrous. *h.* 2ft. Columbia, 1870. Greenhouse shrub. (Ref. B. 229.) SYN. *S. lantanifolia* (of gardens).

S. Grahami (Graham's).* *fl.*, calyx often coloured, tubular, pubescent; corolla purplish-blue, twice as long as the calyx, the lower lip twice as long as the hood; whorls two-flowered; racemes elongated. Summer. *l.* petiolate, oval, obtuse, rounded or cuneate at base, irregularly crenate, nearly glabrous; floral ones ovate, acuminate, ciliated. Branches glabrous or very slenderly pubescent. *h.* 2ft. Mexico, 1829. Greenhouse shrub. (B. R. 1370; L. B. C. 1798; R. G. 242.)

S. Greggii (Gregg's).* *fl.*, calyx narrowly-campanulate, lips half to one-third the length of the tube, lanceolate, acute, nearly straight; corolla carmine, tube twice as long as calyx, throat ventricose, mouth contracted; racemes 2in. long, six to eight-flowered. Autumn. *l.* 1in. to 1½in. long, sub-sessile, linear-oblong, obtuse, narrowed at base, closely gland-dotted, rather dull pale green. *h.* 3ft. Northern Mexico, 1885. Greenhouse shrub. (B. M. 6812.)

S. Heerii (Heer's).* *fl.* pubescent or glandular-pubescent; calyx tubular, irregularly three-toothed; corolla scarlet, thrice as long as the calyx, the tube recurved; whorls two-flowered, secund; racemes terminating the branches and branchlets. Summer. *l.* petiolate, cordate-ovate or lanceolate, acuminate, membranous, crenate-toothed, wrinkled above, slightly canescent beneath; floral ones bract-formed, nearly round, long-acuminate. Stem much branched. *h.* 2ft. to 3ft. Peru, 1855. Greenhouse shrub. (Ref. B. 205; R. G. 115.)

S. hians (gaping).* *fl.* showy; calyx campanulate, bluish, glutinous; corolla of a beautiful blue, thrice as long as the calyx, with an ample, exserted tube and a short, gaping limb; whorls six-flowered; racemes slightly branched. June. *l.* long-petiolate, broadly ovate, broadly cordate-sagittate or truncate at base; floral ones ovate, acuminate, shorter than the calyx. Stem erect, villous. *h.* 2ft. Cashmere, 1830. A pretty perennial, allied to *S. glutinosa*. (B. M. 6517; B. R. 1841, 39; R. G. 1221.)

S. h. plectranthifolia (Plectranthus-leaved). This variety has rather smaller, and less hairy, more deeply violet flowers than the type. (L. & P. F. G. iii. p. 157.)

S. hispanica (Spanish). *fl.*, calyx campanulate, villous-pubescent; corolla blue, shortly exserted, glabrous, four to five lines long; whorls approximate, many-flowered; racemes spike-formed. July. *l.* ovate, acuminate, 2in. to 4in. long, serrated, borne on long petioles; floral ones ovate, exceeding the short pedicels. *h.* 1ft. to 2ft. West Indies (naturalised in Spain), 1739. Hardy, pubescent annual. (B. R. 359.)

S. Horminum (Horminum). *fl.*, corolla purple, half as long again as the pubescent calyx; whorls distant, about six-flowered; racemes simple. June. *l.* petiolate, oval-oblong, rounded or cuneate at base, obtuse, crenate, villous; the upper ones ovate-cordate; floral ones very broad, acute, persistent, rather longer than the calyx, the uppermost ones coloured. Stem erect, villous. *h.* 1½ft. South Europe, 1596. Annual. (S. F. G. i. 20.)

S. Hoveyi (Hovey's). A synonym of *S. ianthina*.

S. ianthina (violet).* *fl.* large; corolla of an intense violet-purple, nearly thrice as long as the calyx, the tube funnel-shaped, the upper lip erect; bracts ovate, acuminate, coloured; whorls six-flowered, clustered. June. *l.* somewhat ovate-cordate, acuminate, crenate, wrinkled, puberulous, paler beneath. Stem erect, 2ft. high, puberulous. Native country uncertain, 1850. Greenhouse perennial. SYN. *S. Hoveyi* (F. d. S. 884; G. C. n. s., xv. p. 145).

S. indica (Indian). *fl.* at first campanulate, afterwards inflated, viscous-pubescent; corolla of a beautiful yellow, spotted with purple, thrice as long as the calyx, the tube scarcely exserted; whorls few, six-flowered, very remote; racemes simple 1½ft. or more long. June. *l.* petiolate, broad or oblong-ovate, acute, slightly toothed or erose-crenate or lobed, broadly cordate at base, glabrous, the lower ones 3in. to 5in. long; floral ones ovate-cordate, reflexed, sessile. Stem erect, slightly pilose. *h.* 3ft. India, 1731. (B. M. 395.)

S. interrupta (interrupted).* *fl.* nearly sessile; calyx deeply grooved, ⅓in. long; corolla dark violet-purple, with a white throat, 1¼in. long, 1in. across, the tube red-purple, nearly straight; whorls numerous, 2in. to 3in. apart, five to ten-flowered. May. *l.* 6in. to 10in. long, spreading, pinnatisect, coarsely wrinkled above, white-tomentose below; terminal lobe 2in. to 3in. long, oblong-ovate: lateral segments distant. Stem erect; branches (as well as the inflorescence) viscid-downy. *h.* 3ft. to 4ft. Tangiers, 1867. (B. M. 5860; R. G. 1210.)

S. interrupta (interrupted), of Sweet. A synonym of *S. confusa*.

S. involucrata (involucred). *fl.*, calyx often coloured, tubular campanulate, viscous; corolla rosy, usually long-exserted, three to five times as long as the calyx, the tube swollen, the lips sub-equal; pedicels nearly equalling the calyx; whorls nearly six-flowered, approximating; racemes spike-formed. August.

Salvia—*continued.*

l. petiolate, ovate, acuminate, 2in. to 3in. long, crenate-serrate; floral ones sessile, bract-like, broadly ovate, acuminate, coloured. Stem several feet high, sparsely branched. Mexico, 1824. Greenhouse or half-hardy sub-shrub. (B. M. 2872; B. R. 1205.)

S. i. Bethellii (Bethell's).* *fl.* bright rosy-crimson, in large, whorled spikes terminating the branches; in the bud each whorl surrounded by a pair of large, coloured bracts. *l.* large, cordate-ovate. 1881. A handsome seedling variety, of bold habit. (F. M. 464 and G. C. n. s., xv. p. 49, under name of *S. Bethellii*.)

S. i. Deschampsiana (Deschamps'). *fl.* in ovate, spike-formed, terminal clusters; calyx (as well as the ovate, caducous bracts) bright red; corolla of a lively rose-colour, the tube much inflated. *l.* cordate, acuminate. *h.* 3ft. or more. French gardens, 1869. (R. H. 1869, 134.)

S. lamiifolia (Lamium-leaved). *fl.*, calyx sub-sessile, tubular; corolla blue, scarcely twice as long as the calyx, the tube sub-equal, the upper lip erect, the lower one shorter; whorls six to ten-flowered; racemes elongated. July. *l.* petiolate, ovate, acuminate, often 3in. to 4in. long, crenate-serrate, rounded or cuneate at base, glabrous or rarely slightly pubescent above; floral ones ovate-lanceolate, equalling the calyx. Stem erect, nearly glabrous. *h.* 2ft. West Indies, &c., 1821. Stove shrub. (B. R. 446; B. M. 1294; L. B. C. 377, under name of *S. amœna*.)

S. lantanifolia (Lantana-leaved). A garden synonym of *S. Goudotii*.

S. leonuroides (Leonurus-like). *fl.*, calyx highly glabrous, tubular-campanulate, with three broad lobes; corolla scarlet, nearly twice as long as the calyx, the tube swollen, the lips sub-equal; pedicels shorter than the petioles; whorls about six-flowered, in the axils of the cauline leaves. June. *l.* ovate or rhomboid, obtuse, slightly crenate, truncate or sub-cordate at base, nearly glabrous above, canescent on the veins beneath. Branches sulcate. *h.* 3ft. Peru, 1783. Greenhouse shrub. (B. M. 376, under name of *S. formosa*.)

S. leucantha (white-flowered). *fl.*, calyx ovate-cylindrical, clothed with dense, violet or lavender-coloured wool, paler beneath; corolla white and woolly, about twice as long as the calyx, the tube thick, curved upwards; whorls six to eight-flowered; spike or raceme much elongated, the rachis covered with violet-coloured wool. June. *l.* narrow, oblong-lanceolate, on short petioles, acute, wrinkled, almost glabrous above, downy beneath. Branches woolly. *h.* 1½ft. to 2ft. Mexico, 1847. Greenhouse shrub. (B. M. 4318.)

S. mentiens (deceiving). *fl.*, calyx scarlet at apex, glabrous, four lines long; corolla of a beautiful scarlet, four or five times longer than the calyx, the tube long-exserted, the lips short and sub-equal; whorls remote, few-flowered; racemes simple, elongated. Summer. *l.* petiolate, ovate, acuminate, serrate, rounded at base, glabrous. Stem glabrous below, spreading and pilose at apex. *h.* 1½ft. Brazil, 1870. Warm greenhouse perennial. (Ref. B. 206.)

S. nutans (nodding). *fl.*, calyx scarcely two lines long; corolla violet, four to five lines long, with a straight, spreading hood; whorls nearly six-flowered, approximate; racemes spike-formed, 1in. to 1½in. long, on long peduncles. July. *l.*, sub-radical ones long-petiolate, ovate-oblong, 4in. to 5in. long, doubly crenate sub-cordate at base, wrinkled; floral ones minute, orbicular. Stem pubescent, nearly simple, 2ft. to 3ft. high. Eastern Europe, 1780. (B. M. 2436.)

S. obtusa (obtuse-leaved). *fl.*, calyx tubular-campanulate, pubescent; corolla carmine, 1in. long, the tube inflated, twice as long as the calyx; whorls two-flowered, distant. Summer. *l.* petiolate, ovate, obtuse, 1in. long, cuneate at base, nearly glabrous above, cano-pubescent beneath. Stems bifarious, pubescent. *h.* 1½ft. Mexico, 1861. Greenhouse perennial. (F. d. S. 1412; R. G. 242, Fig. 1.)

S. odorata (sweet-scented). *fl.* shortly pedicellate; calyx campanulate, hairy-pubescent; corolla white, nearly thrice as long as the calyx, the upper lip falcate and compressed; whorls two-flowered, nearly 1in. distant; panicle 1ft. or more long, much-branched. July. *l.* petiolate, ovate-lanceolate, acuminate, irregularly crenate-toothed, cordate at base, 3in. long, wrinkled, white-tomentose; upper ones sessile; floral ones shorter than the pedicels, persistent. Branches ascending, the upper ones erect. *h.* 3ft. Bagdad, 1804. Greenhouse sub-shrub.

S. officinalis (officinal). Common Sage. *fl.*, calyx four to five lines long, campanulate, pubescent or villous; corolla purple, blue, or white, twice or thrice as long as the calyx; whorls few, ten to twenty-flowered, dense; racemes sub-simple. June. *l.* 1in. to 1½in. long, petiolate, entire, oblong, narrowed or rounded at base, wrinkled; lower ones white, tomentose or woolly below or on both sides; floral ones sessile, ovate, acuminate. Stem white-woolly; floriferous branches tomentose-pubescent. *h.* 1ft. South Europe, 1597. Hardy shrub. (B. M. Pl. 206.) For culture, &c., *see* **Sage.**

S. o. aurea (golden). A dwarf, compact form, with yellow flowers. It is very useful for ornamental bedding. 1879. Garden variety.

S. oppositiflora (opposite-flowered).* *fl.*, calyx tubular, with three acute teeth; corolla scarlet, four times as long as the calyx, pubescent outside, the tube long-exserted; whorls two-flowered, secund; racemes simple, 1in. long. June. *l.* petiolate, ovate,

Salvia—*continued.*

obtuse, 1in. to 1½in. long, rounded or cordate at base, wrinkled, pubescent; floral ones deciduous. Stem procumbent at base; branches erect, slenderly pubescent. *h.* 2ft. Peru, 1847. Half-hardy sub-shrub. (F. d. S. 345; P. M. B. xv. 53; R. G. 1855, 127.)

S. paniculata (panicled). *fl.* disposed in distant pairs, shortly stalked; calyx sub-campanulate, scabrid, two-lipped, ⅓in. long; corolla pale purplish-blue, four times as long as the calyx; tube short, wide; upper lip 1in. to 1½in. long, narrow sickle-shaped, obtuse. Summer. *l.* 1in. to 2in. long, leathery, obovate, acute or obtuse, irregularly toothed, scabrid on both surfaces, narrowed into a short stalk. *h.* 6ft. to 7ft. South Africa. Greenhouse shrub. (B. M. 6790.)

FIG. 411. FLOWERING BRANCH OF SALVIA PATENS.

S. patens (spreading).* *fl.*, calyx campanulate, six to seven lines long; corolla blue, upwards of 2in. long, the tube broad, the lips slightly gaping; whorls few, remote. September. *l.* petiolate, ovate-deltoid, crenate, hastate (or the upper ones rounded) at base, hispid; floral ones linear-lanceolate. Stem erect, pilose. *h.* 2½ft. Mexico, 1838. Half-hardy perennial. See Fig. 411. (B. iii. 109; B. M. 3808; B. R. 1839, 23; F. d. S. 503; P. M. B. vi. 1.) In some forms of this species, the leaves are all hastate, or the upper ones, or nearly all, rounded-cordate at base.

S. p. alba (white). A variety only differing from the type in having white flowers.

S. Pitcheri (Pitcher's). A synonym of *S. azurea grandiflora.*

S. porphyrantha (purple-flowered). A synonym of *S. Rœmeriana.*

S. porphyrata (purplish). A synonym of *S. Rœmeriana.*

S. pratensis (meadow-loving). *fl.*, calyx (as well as the small, ovate-cordate bracts) coloured; corolla bright blue, 1in. long, glabrous inside, the upper lip long and much arched, the lower broad; whorls about four-flowered, in spikes 1ft. to 1½ft. long. June to August. *l.* wrinkled, 3in. to 6in. long; radical ones oblong or ovate, long-petioled, obtuse, sometimes two-lobed at the base, with large, irregular crenatures; cauline ones few, similar or more oblong, smaller, on shorter petioles. *h.* 2ft. or more. Europe (Britain). (Sy. En. B. 1058; S. B. F. G. 26, under name of *S. Tenorii.*) Of this species, there are varieties with flesh-coloured, reddish, and white flowers.

Salvia—*continued.*

S. prunelloides (Prunella-like). *fl.* blue; corolla three times longer than the calyx, pubescent outside, the middle lobe of the lower lip emarginate; whorls remote, sub-secund; racemes simple, on long peduncles. August. *l.* petiolate, ovate-oblong, obtuse, crenate, narrowed at base, nearly glabrous. Stems erect, pilose-pubescent. *h.* 1ft. Mexico, 1838. (P. M. B. xi. 175.)

S. pulchella (pretty). *fl.*, calyx tubular, half or one-third as long as the corolla, slenderly pubescent; corolla scarlet, rarely exceeding 1in. in length, glabrous or pubescent outside, the tube ventricose; whorls about ten-flowered; racemes simple. December. *l.* petiolate, ovate, narrowed and slightly obtuse at apex, crenate, broadly cordate at base, slightly wrinkled, nearly glabrous; floral ones ovate, acuminate. Branches pubescent. *h.* 2ft. Mexico and Guatemala, 1821. Greenhouse shrub.

S. Regla (Regla). *fl.* nearly sessile; calyx coloured, tubular-inflated, with three short, ovate teeth; corolla scarlet, twice as long as the calyx, pubescent outside, the lips sub-equal; whorls terminal, few-flowered. July. *l.* petiolate, rounded-deltoid, obtuse, 1½in. long, sinuate-crenate, broadly sub-cordate at base, rufescent, wrinkled, slightly hispid above, pubescent on the nerves beneath. Branches purplish. *h.* 1½ft. Mexico, 1839. Hardy shrub. (B. R. 1841, 14.)

S. rhombifolia (rhomb-leaved). *fl.*, calyx often coloured, ovate, pubescent; corolla blue, half as long again as the calyx, the tube included; whorls about six-flowered, remote; racemes simple, few-flowered. All the year. *l.* numerous, petiolate, broadly ovate or rhomboid, 1½in. to 2in. long and broad, sub-cordate, pubescent; upper ones often sessile; floral ones ovate-lanceolate, deciduous, shorter than the calyx. Stem erect, branched, pubescent, 1ft. high. Peru, 1827. Stove annual. (B. R. 1429, under name of *S. foliosa.*)

S. ringens (gaping).* *fl.* reddish-purple; calyx striated; corolla four times as long as the calyx, the tube swollen, recurved-ascendent, the upper lip erect, sub-falcate, the lower large, with reflexed lobes; whorls about six-flowered, loose, remote. Summer. *l.* petiolate, irregularly pinnatisect; segments unequal, ovate-oblong, rounded at base, villous; floral ones deciduous. *h.* 1ft. to 2ft. Greece. Hardy shrub. (R. G. 59; S. F. G. 18.)

S. Rœmeriana (Rœmer's).* *fl.*, calyx somewhat pubescent, naked within; corolla deep scarlet. puberulent, 1in. or more long, narrowly tubular-infundibuliform, somewhat arcuate; racemes loose and elongated. July. *l.*, or terminal leaflet, roundish or cordate-reniform, coarsely repand-toothed or crenately incised; lower ones with two or three similar or smaller lateral leaflets, occasionally reduced to tooth-like appendages; floral leaves mostly shorter than the pedicels. Stems 1ft. to 2ft. high, often sparsely hairy below. Texas, 1852. SYNS. *S. porphyrantha* (F. d. S. 1080; R. H. 1854, 16), *S. porphyrata* (B. M. 4939).

S. Rœzlii (Roezl's). *fl.*, calyx pale green, stained with red towards the apex, inflated; corolla bright scarlet, puberulous, having two prominent, spreading lips. Summer. *l.* smooth, ovate-oblong, crenately toothed. *h.* 1½ft. Mexico, 1861. A rather showy, greenhouse under-shrub. (F. d. S. 1407.)

S. rubescens (reddish). *fl.*, calyx purple-brown, densely glandular-hairy; corolla scarlet, 1in. long (twice as long as the calyx), the tube slightly ascending; whorls rather distant, four to eight-flowered; panicle 1ft. or more long, ebracteate. Summer. *l.* variable in size, 4in. to 10in. long, long-petiolate, ovate-cordate, crenate, acute or acuminate, puberulous above, hoary beneath. Stems four-angled. *h.* 1½ft. Columbia, 1872. Stove shrub. (B. M. 5947.)

S. rutilans (glowing-red).* Pineapple-scented Sage. *fl.* disposed in spike-like racemes, forming leafy panicles; corolla of a bright scarlet colour, having a slender tube and a deflexed lower lip. Summer. *l.* cordate-ovate, acuminate, soft, downy. *h.* 2ft. to 3ft. Origin uncertain, 1873. Greenhouse sub-shrub. (G. C. n. s., xv. p. 117; R. H. 1873, 251.)

S. scabiosæfolia (Scabious-leaved). *fl.* pretty; calyx ample, campanulate, villous; corolla whitish, twice as long as the calyx, the upper lip bifid; whorls six to ten-flowered, distinct; racemes 4in. to 6in. or more long, simple. August. *l.* numerous, pinnatisect; segments three to five-jugate, often ternate or twin, entire, bisected, or pinnatisect, oblong or linear, acute. Stems diffuse, 1ft. to 1½ft. long. Branches diffuse, woolly-pilose. Tauria, 1818. (B. M. 5209; B. M. 1429, under name of *S. Hablitziana.*)

S. Schimperi (Schimper's). *fl.*, calyx tubular-campanulate, the upper lip three-toothed, the lower one bifid; corolla white, twice as long as the calyx; panicle twiggy-branched. Summer. *l.* ample, ovate-lanceolate, acute, crenulate, rounded-cuneate at base, wrinkled, white-woolly on both sides, snowy beneath; floral ones very broad, equalling the calyx, scabrous-ciliated, whitish beneath. Stem thick, pubescent or slightly woolly at base. *h.* 3ft. Abyssinia, 1875. Half-hardy sub-shrub. (B. M. 6300.)

S. Sclarea (Sclarea).* Clary. *fl.*, calyx whitish at base, campanulate, pubescent-hispid; corolla bluish-white, twice as long as the calyx, the tube contracted, the upper lip falcate and compressed; whorls distant, about six-flowered; racemes paniculate. August. *l.* petiolate, ample, often 8in. to 9in. long, ovate, erose-crenate, cordate at base, wrinkled, hoary (more glabrous under cultivation); uppermost ones amplexicaul; floral ones coloured, very

Salvia—*continued.*

broad, acuminate, concave. Stem erect, 2ft. to 3ft. high, viscous, villous. South Europe, 1562. (S. F. G. 25; B. M. 2320, under name of *S. bracteata*; B. R. 1003, under name of *S. Simsiana*.)

S. splendens (splendid).* *fl.*, calyx coloured, campanulate, with three broadly ovate teeth; corolla scarlet, 2in. to 2½in. long, glabrous, the tube exserted and slightly enlarged, the lower lip shortened; whorls two-flowered. December. *l.* petiolate, ovate, acuminate, crenate-serrate, cuneate, rounded, or sub-cordate at base, glabrous; floral ones ovate, acuminate, coloured, deciduous. Branches glabrous. *h.* 3ft. Brazil, 1822. A very pretty, greenhouse shrub. (B. R. 687; L. B. C. 1089; I. H. 1881, 432, under name of *S. brasiliensis*.) SYN. *S. colorans* (of gardens).

S. s. Bruantii (Bruant's).* *fl.* of a brighter scarlet than in the type. Habit dwarfer. 1881. A handsome garden variety. (F. M. 447; G. C. n. s., xiv. p. 781.)

S. strictiflora (erect-flowered). *fl.*, calyx tubular, pubescent; corolla golden-scarlet, 1½in. long, the tube elongated and incurved, the lip sub-equal, scarcely spreading; whorls two-flowered, secund; racemes upwards of 1ft. long. December. *l.* petiolate, ovate, acute, 1½in. to 2in. long, pale green, crenate-serrate, cordate at base, rather thick, slightly fleshy, nearly glabrous; floral ones glume-like, deciduous. Branches shortly tomentose-pubescent. *h.* 2ft. Peru, 1831. Stove shrub. (B. M. 3135; P. M. B. 247.)

S. taraxacifolia (Dandelion-leaved). *fl.* very shortly pedicellate; calyx ½in. long, the lobes subulate-aristate; corolla pale pink, with a yellowish disk to the lower lip, and a purple-speckled, pilose palate; whorls six to ten-flowered. July. *l.* 2in. to 4in. long, pinnatisect, sessile or petiolate; lower lobes few or many; terminal one 1in. to 1½in. long, ovate, obtuse or cuspidate, irregularly sinuate-toothed; all snowy-tomentose beneath; floral ones sessile, ovate-aristate. Stems numerous, ascending, at length erect, 6in. to 18in. high. Great Atlas, 1872. (B. M. 5991.)

S. tricolor (three-coloured). *fl.* racemose, solitary, opposite; calyx oblong-campanulate, deeply costate; corolla white, the lower part of the large lower lip reddish, deflexed, trilobed. July. *l.* small, shortly petiolate, ovate, rounded-obtuse at apex with a terminal tooth, the base attenuated, sub-decurrent, the margins crenulate. *h.* 2ft. Mexico. Half-hardy shrub. (F. d. S. 1237; I. H. 1856, 120.)

S. tubifera (tube-bearing). *fl.* sub-sessile; calyx tubular, with three acuminate teeth; corolla purple-red, 1in. to 1¼in. long, glabrous or pubescent, the tube long-exserted, equal, and slightly incurved; whorls usually four or five-flowered, secund; racemes 6in. long, simple. August. *l.* petiolate, broadly ovate, crenate-serrate, rounded-truncate or nearly cuneate at base, almost glabrous, or cano-pubescent beneath. Stem 2ft. or more long, erect or ascending, acutely tetragonal, purplish. Mexico, 1824. Greenhouse perennial herb or under-shrub. (B. R. 1841, 44.)

S. Verbenaca (Vervain-like). Vervain Sage; Wild Clary, &c. *fl.*, calyx campanulate, the upper lip having minute, spinescent teeth; corolla blue-purple, ¼in. long, the upper lip short and compressed; whorls six-flowered, in long, bracteate spikes. June to September. *l.* 2in. to 4in. long, wrinkled; radical ones petioled, oblong, obtuse, irregularly crenate or serrate; upper cauline ones sessile, oblong or deltoid-ovate. Stem leafy, erect, 1ft. to 2ft. high. Europe (Britain). Hardy perennial. (Sy. En. B. 1056.)

S. V. clandestina (clandestine). *fl.*, upper calyx teeth less spiny than in the species; corolla more purple, longer, the upper lip longer arched. *l.* narrower. Jersey and Guernsey. Plant smaller and more slender than the type. (S. F. G. 24; Sy. En. B. 1057.)

SALVINIA (named in honour of Antonio Maria Salvini, a Professor at Florence in the seventeenth century). ORD. *Salvinieæ*. A small genus (all the supposed species are reducible to one) of plants found floating on still water (like *Lemna*), broadly dispersed over the Northern hemisphere, and in tropical and South America. "This pretty little floating aquatic, which, like *Azolla*, is suitable for a stove, greenhouse, or indoor aquarium, is easily managed in the summer time, simply requiring to be let alone or have its water changed, if necessary; but in the winter is often lost through a want of knowledge of its life-history. The mature plant floats on the water, and has no true roots, though the row of divided leaves on the under side of the stem look like roots at first sight, and assume their functions. Among these the spore capsules are developed, and from them the plant must be grown annually, as the old plants die in the winter. The best way to preserve the spores is to half fill a broad pan with sandy loam, and then fill up with water; when the water has cleared, place a number of plants upon it, and stand the pan by in a cool greenhouse. In

Salvinia—*continued.*

the winter, the plants will all die, but the spores will remain in the loam, which must not be thrown away or allowed to dry, and the next spring they will reproduce the plant" (N. E. Brown).

S. natans (floating). *fr.* consisting of globular bags, composed of a double membrane, at length bursting irregularly. *l.* Fern-like, sub-elliptic, entire, floating, not curled up when young. Rhizome floating, thread-like, leafy above, and furnished below with long rootlets and fruit on short, leafless branches. The young plant closely resembles a young Selaginella, apart from the two cotyledon-like processes.

SALVINIEÆ. A small natural order of annual, floating herbs, not attached to the soil, resembling large Lemnæ (*Salvinia*) or a Jungermannia (*Azolla*), with no true stem. *Salvinia* is met with throughout the Northern hemisphere, as well as in tropical and South America; and *Azolla*, the only other genus, inhabits Asia, Africa, Australia, and America from Canada to the Straits of Magellan. Fronds with margins reflexed before expansion, usually claret-coloured on the under surface, sometimes composed of cellular tissue, without nerves and stomata (*Salvinia*); sometimes with a stomatiferous epidermis (*Azolla*), rounded or lobed, sessile or sub-sessile, alternate or distichous, imbricated. Reproductive organs of two kinds, similar to those of *Marsileaceæ*, inserted at the base of the fronds. The order embraces about eighteen species.

SAMARA (of Swartz). A synonym of **Myrsine** (which *see*).

SAMARA. An indehiscent fruit, producing a wing from its back or end; *e.g.*, the fruit of the Maple.

SAMAROID. Resembling a Samara.

SAMBUCUS (the old Latin name used by Pliny, and derived from *sambuke*, an ancient musical instrument, supposed to have been made of Elder-wood). Elder. SYN. *Tripetalus*. ORD. *Caprifoliaceæ*. A genus comprising ten or twelve species of mostly hardy trees, sub-shrubs, or shrubs, rarely perennial herbs; they are dispersed over all temperate regions (South Africa excepted) and tropical mountains. Flowers white, yellow, or pinkish, small, with articulated pedicels, disposed in umbelliform corymbs or dense-flowered thyrses; calyx tube ovoid or turbinate, the limb equally three to five-lobed or toothed; corolla rotate or rotate-campanulate, equally three to five-parted, the lobes imbricated or rarely valvate; stamens five. Drupes baccate, containing three to five one-seeded stones. Leaves opposite, imparipinnate; leaflets serrated or laciniated, naked at base, glandular or augmented by a stipuliform leaflet. Branches rather thick. Two species, *S. Ebulus* and *S. nigra*, are indigenous to Britain. The berries of the latter are largely employed in the manufacture of Elderberry wine. Various kinds of medicine, cosmetics, &c., are obtainable from several of the species. Speaking of the common Elder, Evelyn remarks: "If the medicinal properties of the leaves, bark, berries, &c., were thoroughly known, I cannot tell what our countryman could ail for which he might not fetch a remedy from every hedge, either for sickness or wound." The species in cultivation are described below. They are all hardy, and are of very simple culture, thriving in almost any soil or situation. Propagation may be effected, in the case of the herbaceous species, by division; the shrubby kinds increase readily from cuttings. The common Elder fruits abundantly, if the soil be kept somewhat moist; its position should be an open one, fully exposed to light and air. A plantation or hedge may be readily formed by cuttings of this species, where the soil is tolerably moist. The Golden Elder (*S. nigra aurea*) is a fine ornamental plant for shrubberies, or for use in sub-tropical gardening. If the young shoots are regularly pinched at their points, the plants may be kept dwarf and of a fine golden colour all the summer.

Sambucus—*continued.*

S. canadensis (Canadian). *fl.* white, almost scentless; cymes of five main branches. July and August. *fr.* deep bluish-black. *l.* pinnate or sub-pinnate; leaflets about nine, oblong, oval, stiffish, acuminate, more or less pubescent beneath, sometimes appendiculated at the base. *h.* 4ft. to 6ft. Canada to Carolina, 1761. Shrub. (B. M. Pl. 138.)

S. Ebulus (Ebulus). Dane's Blood; Dane Weed; Danewort; Deadwort; Dwarf Elder, &c. *fl.* white, tipped with pink, broadly campanulate; cymes 3in. to 4in. in diameter, three-rayed, corymbose, compact. July and August. *fr.* black, small, globose. *l.*, leaflets four to six pairs, oblong-lanceolate, 4in. to 6in. long, serrated; stipules leafy, serrated. Stems 2ft. to 4ft. high, many, stout, ribbed and grooved. Europe (Britain), North Africa. Herbaceous perennial. (Sy. En. B. 638.)

FIG. 412. PORTION OF INFLORESCENCE OF SAMBUCUS NIGRA.

S. nigra (black).* Boon-tree; Bur-tree; Common Elder. *fl.* white, rotate, ¼in. in diameter; cymes 4in. to 6in. in diameter, flat-topped, five-rayed. June. *fr.* black, rarely green, small, globose. *l.*, leaflets two to four pairs, 1in. to 3in. long, ovate, oblong, or lanceolate, rarely orbicular, serrated; stipules small or absent. Trunk often as thick as the thigh; branchlets angular. *h.* 25ft. Europe (Britain), North Africa. Tree. See Fig. 412. (B. M. Pl. 137; Sy. En. B. 637.)

S. n. aurea (golden).* Golden Elder. A fine variety, with golden leaves.

S. n. laciniata (torn).* Parsley-leaved Elder. *l.*, leaflets cut into fine segments. A handsome form.

S. n. monstrosa (monstrous). *fl.* five to fifteen-parted; stigmas five to twelve. *fr.* irregular. Branches striped.

S. n. rotundifolia (round-leaved). *fl.* in few-flowered corymbs. *l.* trifoliolate; leaflets petiolate, roundish, serrated.

Other forms of *S. nigra* are: *foliis argenteis* and *foliis luteis*, leaves variegated with white and yellow respectively; *leucocarpa*, fruit white; *virescens* fruit yellowish-green.

S. pubens (downy). *fl.* whitish, in a thyrsoid panicle. April and May. *fr.* red. *l.* pinnate; leaflets five, membranous, ovate-lanceolate or oblong, acuminated, serrated, pubescent, but chiefly on the under side. *h.* 6ft. to 12ft. North America, 1812. A large shrub or low tree.

S. racemosa (racemose-flowered).* Hart's Elder; Scarlet-berried Elder. *fl.* white; panicle ovate. April and May. *fr.* scarlet. *l.* pinnate, pale green, large, rather smooth; leaflets five, membranous, oblong, acuminated, serrated, unequal at the base; petioles glabrous. *h.* 10ft. to 20ft. South Europe and Siberia, 1596. A low tree or large shrub. (F. D. 2951.) The form *laciniata* has jagged leaflets. *plumosa* has deeply pinnatifid leaflets.

SAMBUL PLANT. A common name for *Ferula Sumbul.*

SAMOLUS (an old name which Pliny ascribes to the Druids, and which is thought by Sprengel to refer to *S. Valerandi*). Brook-weed. ORD. *Primulaceæ.* A genus comprising about eight species of greenhouse or hardy herbs, sometimes shrubby at base. *S. Valerandi* is cosmopolitan, growing wild in Britain, and the rest are mostly found on the seashores of extra-tropical Southern regions. Flowers white, in terminal racemes or corymbs; calyx one-half superior, the limb five-fid; corolla perigynous, nearly campanulate, five-parted; stamens five. Leaves alternate, the lower ones sometimes rosulate, linear, oblong, or spathulate, entire. The species have no great ornamental value. One only calls

Samolus—*continued.*

for description here. It thrives freely in ordinary soil, in a moist position; and may be increased by division.

S. repens (creeping). *fl.* pinkish-white, usually four to five lines across; corolla tube broad, as long as the ovate lobes. August. *l.*, radical ones petiolate, ovate or oblong; cauline ones usually small, linear or oblong. Stems simple or branched, prostrate or erect, and 6in. to 12in. high. Australia, 1806. Hardy perennial. (L. B. C. 435, under name of *S. littoralis.*)

SAMPHIRE (*Crithmum maritimum*). A native, hardy perennial, which grows naturally near the sea-coast, and is not very easily cultivated inland. The leaves are occasionally used in salads, and for seasoning. It requires, under cultivation, a warm position at the foot of a south wall, and an occasional dressing of sea-salt; protection must also be provided in winter. Propagation is effected by divisions or by seeds; the latter should be sown soon after they are ripe, in autumn.

SAMYDA (from *Samydo*, the old Greek name used by Theophrastus for the Birch; in allusion to the resemblance in habit). ORD. *Samydaceæ.* A small genus (two species) of stove, evergreen shrubs, natives of the West Indies. Flowers white, pink, or greenish, rather large, solitary or fascicled; calyx tube campanulate, coloured; lobes four to six, imbricated, unequal; petals absent; stamens eight to thirteen, the filaments connate in a tube. Leaves distichous, alternate, oblong, pellucid-dotted; stipules minute. The species are ornamental subjects; they thrive in a mixture of loam and peat. Propagated readily by cuttings, inserted in a pot of sand, under a hand glass, in slight heat.

S. glabrata (glabrous). *fl.* greenish-white, solitary or a few in the axil, sub-sessile or shortly stalked, campanulate, about ⅜in. long. July and August. *l.* oblong, entire or obsoletely serrulated, glabrous, 3in. to 5in. long; pellucid dots and lines distant. Branchlets pubescent. *h.* 5ft. to 12ft. 1800. SYN. *S. spinulosa.*

S. serrulata (serrulated). *fl.* white or red, ½in. or more long, solitary or fascicled, campanulate, pubescent; calyx lobes blunt. July. *l.* soft, oblong or elliptic, serrated, pointed or blunt, 2in. to 4in. long, pubescent or glabrous above, velvety beneath. *h.* 4ft. 1723. (B. M. 550, under name of *S. rosea.*)

S. spinulosa (slightly spiny). A synonym of *S. glabrata.*

SAMYDACEÆ. A natural order of glabrous, pubescent, or tomentose trees or shrubs, broadly dispersed over tropical regions. Flowers regular, usually hermaphrodite, inconspicuous, racemed, fascicled, or panicled; calyx coriaceous, persistent, the tube usually free, the limb of three to seven imbricate or valvate lobes; petals as many as the calyx lobes, and similar, rarely more or wanting, imbricate in bud; stamens definite or indefinite, in one or many series, usually alternating with staminodes, equidistant or collected in fascicles; filaments filiform or capillary, free or connate; anthers didymous or oblong; pedicels articulated and bibracteolate. Fruit indehiscent or capsular, one-celled, one or many-seeded, three to five-valved at the top and throughout its length. Leaves petiolate, simple, alternate and distichous, rarely opposite or whorled, sometimes pellucid-dotted, entire or serrated, the teeth sometimes gland-tipped; stipules small, usually deciduous, or absent, rarely leafy. The order comprises seventeen genera, and about 150 species. Examples: *Abatia, Banara, Cascaria, Homalium*, and *Samyda.*

SANCHEZIA (named in honour of Josef Sanchez, Professor of Botany at Cadiz). SYN. *Ancylogyne.* ORD. *Acanthaceæ.* A noble genus of stove, erect, perennial herbs or sub-shrubs, glabrous or loosely pilose above; there are about eight species, natives of Peru, Columbia, and Brazil. Flowers orange, reddish, or purple, sessile in the axils of the bracts, or shortly pedicellate and fascicled or rarely solitary; calyx deeply five-fid or five-parted; corolla tube long, cylindrical or slightly swollen above the middle, limb of five rounded, spreading lobes; bracts sometimes ample, in a cup-like fascicle, sometimes narrow or small; bracteoles resembling calyx segments. Leaves opposite, ample, entire or scarcely toothed. Two species

Sanchezia—*continued.*

have been introduced. They require culture similar to **Barleria** (which *see*).

S. longiflora (long-flowered).* *fl.* about 2in. long, tubular, and, together with the calyces, pedicels, and branches of the panicle, of a rich vinous-purple colour, disposed on drooping, elongated branched panicles. April. *l.* ample, ovate-oblong or obovate-lanceolate. Stems four-angled. Guayaquil, 1866. A handsome perennial, of shrubby habit. (F. d. S. 2460; B. M. 5588, under name of *Ancylogyne longiflora.*)

S. nobilis (noble).* *fl.*, corolla yellow, 2in. long, cylindrical, slightly curved; bracts bright red, 1in. to 1½in. long, each pair inclosing eight to ten flowers; inflorescence erect, terminal, consisting of numerous opposite fascicles, forming a dense panicle, with deep purple branches. June. *l.* 3in. to 9in. long, oblong-obovate or oblong-lanceolate, acuminate, obtusely toothed, narrowed into short, broad-winged petioles which are connate at base. *h.* 1ft. to 3ft. Ecuador, 1866. Sub-shrub. (B. M. 5594; F. d. S. 2437.)

FIG. 413. SANCHEZIA NOBILIS GLAUCOPHYLLA.

S. n. glaucophylla (glaucous-leaved).* A variety having leaves of a glaucous-green, striped with white or yellow. See Fig. 413. (I. H. 580.) SYN. *S. n. variegata.*

S. n. variegata (variegated). A synonym of *S. n. glaucophylla.*

SAND. The use and value of Sand for plant-propagation, and for intermixing with composts, &c., generally, are known to nearly every gardener. Sand tends to insure porosity, by keeping composts open, and, when laid over the surface of pans or pots prepared for cuttings, settles more closely, on being watered, than does soil, and so holds the cuttings firm, and excludes air. Numerous sorts of cuttings are rooted best in Sand alone, as this substance contains nothing which can decompose, and prevent the formation of roots. While there is an advantage in this, Sand, on the other hand, contains in itself nothing nutritive for supporting plants; they must therefore be potted in soil, according as each may require, soon after roots are formed. Water is sufficient for supplying all that tender little rootlets need for a time, until the plants are sufficiently strong to be potted. Silver Sand is best, and is that most extensively used: the coarser it is, the better. Sand from the sea-coast is by some gardeners largely employed for propagating. Road Sand is invaluable for mixing in composts, especially those for growing such plants as Carnations; it is usually coarse and sharp, from being washed by heavy rains. Although Sand is so generally used in composts, yet its place may be taken with advantage by charcoal or charred soil, when either is procurable. Charcoal is of an enduring nature, and possesses the property of absorbing gases, which Sand does not; it also acts most effectually in keeping a compost open. Sand is valuable

Sand—*continued.*

for placing around tender bulbs when planting, to preserve them from injury by being in contact with decomposing substances in the soil, and to provide a ready means of escape for any undue accumulation of water.

SANDAL-TREE. *See* **Sandoricum.**

SANDAL WOOD. The wood of *Santalum album.*

SANDARACH GUM-TREE. A common name for *Callitris quadrivalvis.*

SANDBOX TREE. *See* **Hura.**

SANDERSONIA (named in honour of John Sanderson, Honorary Secretary of the Horticultural Society of Natal). ORD. *Liliaceæ.* A monotypic genus. The species is a pretty, tuberous-rooted, erect-growing herb, with simple, leafy stems. For culture, *see* **Gloriosa.**

S. aurantiaca (orange-coloured).* *fl.* orange-coloured, showy, nodding, on axillary, solitary, ebracteate pedicels; perianth persistent, urceolate-globose, slightly inflated, with a short, six-cleft mouth, and having six short horns or spurs forming nectariferous cavities at the base; stamens six, hypogynous, much shorter than the perianth. *l.* lanceolate, with a sometimes cirrhose acumen; upper cauline and floral ones similar, or the uppermost ones smaller. *h.* 1½ft. Natal, 1852. (B. M. 4716.)

SAND LEEK. A common name for *Allium Scorodoprasum.*

SAND MYRTLE. *See* **Leiophyllum.**

SANDORICUM (altered from *Santoor*, the Malay name of the genus). Sandal-tree. ORD. *Meliaceæ.* A genus of about four species of stove, evergreen, glabrous or pubescent-tomentose trees, natives of the Moluccas. Flowers yellow, sparse or glomerate, bracteate; calyx cup-like, the limb of five short, imbricated lobes; petals five, free, imbricated; panicles axillary. Fruit apple-shaped, fleshy, acid, edible. Leaves trifoliolate; leaflets ample, nerved. *S. indicum* is extensively cultivated in the tropics. It thrives in a compost of loam and peat. Propagation may be effected by cuttings, inserted in sand, under a hand glass, in heat.

S. indicum (Indian). *fl.* disposed in axillary, somewhat panicled racemes. *fr.* agreeably acid, containing five ovate-compressed nuts. *l.*, leaflets ovate-oblong, entire, pubescent. Lofty tree. 1820. (B. F. S. 319.)

SAND VERBENA. *See* **Abronia.**

SANDWORT. *See* **Arenaria.**

FIG. 414. SANGUINARIA CANADENSIS (page 356).

SANDY PEAR. *See* **Pyrus sinensis.**

SANGUINAIRE PLANT. A common name for *Paronychia argentea.*

SANGUINARIA (from *sanguis*, blood; the rootstock of the plant is surcharged with a reddish-orange, acrid juice). Blood-root; Red Puccoon. ORD. *Papaveraceæ.* A monotypic genus. The species is a low, hardy, perennial herb, with a thick, prostrate rootstock. It proves useful for ornamenting the front of flower borders. A light, sandy loam or peat soil is suitable. Increased by division of the roots, or by seeds.

S. canadensis (Canadian).* Common Bloodroot; Bloodwort. *fl.* white, handsome; sepals two; petals eight to twelve, in two or three series, not crumpled; stamens numerous; scape naked, one-flowered. April and May. *l.* solitary, rounded, palmately veined. *h.* 6in. North America, 1680. See Fig. 414. (B. M. 162.)

SANGUINE, SANGUINEOUS. Dull red, passing into brownish-black.

SANGUISORBA. Included under *Poterium.*

SANGUISORBACEÆ. Included under *Rosaceæ.*

SANHILARIA. A synonym of **Stifftia** (which *see*).

SANICLE, BEAR'S EAR. *See* **Cortusa.**

SANSEVIELLA. A synonym of **Reineckea** (which *see*).

SANSEVIERA (named after Raimond de Sansgrio, Prince of Sanseviero, 1710-1776). Bowstring Hemp. SYNS. *Acyntha, Salmia.* ORD. *Hæmodoraceæ.* Nine species are enumerated by Mr. Baker as belonging to this genus; they are stove, herbaceous perennials, with short, thick, sometimes stoloniferous rhizomes, natives of tropical and South Africa and the East Indies. Flowers mediocre or long, racemose; perianth tube sometimes very long, scarcely enlarged at apex, the lobes narrow, equal, and slightly spreading; stamens six; pedicels articulated at apex; scape simple, tall. Leaves rosulate, thick, cartilaginous, fibrous within, often elongated, nearly flat or terete. The four best-known species are described below. They are interesting plants, thriving in sandy loam. Propagation may be effected by suckers. When dormant, the plants should be sparingly watered.

S. cylindrica (cylindrical). *fl.*, perianth whitish, 1in. to 1¼in. long, the segments equalling the very slender tube; anthers at length exserted; raceme 2ft. to 2½ft. long, 2½in. to 3in. thick when expanded; scape nearly 1ft. high, firm. August. *l.* arcuate, cylindrical, 3ft. to 4ft. long, 1in. thick, rigid, coriaceous. South tropical Africa, 1856. (B. M. 5093.)

S. guineensis (Guinea). *fl.*, perianth whitish, tinged with greenish-brown, 2in. long, the segments equalling the tube; raceme simple, 1½ft. to 2ft. long, 3in. broad when expanded; scape 1ft. to 1½ft. high, glaucous, purplish-green, with three or four deltoid bracts. September. *l.* sub-erect, oblanceolate, cartilaginous, 3ft. to 4ft. high, 2½in. to 5in. broad above the middle, whitish or obscurely reddish on the margins, white-spotted, cuspidate. Guinea, 1690. (B. M. 1179.) *S. glauca, S. laetevirens,* and *S. polyphylla,* are mere forms of this species.

S. longiflora (long-flowered). *fl.*, perianth greenish-white, 3½in. to 4in. long, at length drooping, the segments one-third the length of the tube; raceme dense, 1ft. to 1½ft. long, 8in. to 9in. thick; scape 1ft. or more long. July. *l.* sub-erect, oblanceolate, 1ft. to 2ft. long, 3in. to 4in. broad, white-spotted, distinctly red-margined, cartilaginous, but not thick. Tropical Western Africa, 1824. (B. M. 2634.)

S. zeylanica (Cingalese). *fl.*, perianth greenish-white, 1¼in. to 1½in. long, the segments equalling the tube; raceme 1ft. or more long, 2in. to 2½in. thick; scape 1ft. or more high. September. *l.* falcate, 1ft. to 2ft. or more long, ensiform, sub-terete, ¾in. to 1in. broad at base, deeply channelled, obscure green with white markings, the margins scarious and distinctly red-lined. East Indies, 1731. (B. R. 160.) *S. ensifolia, S. grandicuspis, S. pumila,* and *S. stenophylla,* are mere garden forms of this species.

SANTALACEÆ. A natural order of trees, shrubs, or dwarf herbs, a few of which are parasitic on trees or roots; they are broadly dispersed over tropical and temperate regions. Flowers greenish, yellowish-green, or rarely orange, usually small, but in a few instances conspicuous, hermaphrodite or dicœcious, or rarely moncœcious by abortion, regular; perianth simple, green

Santalaceæ—*continued*

or corolla-like, sometimes slightly fleshy, adnate to the disk or to the base of the ovary, four, five, or rarely three or six-lobed, valvate or rarely loosely imbricated; stamens (except in *Grubbia*) as many as the perianth lobes; filaments filiform or rather broad, sometimes very short; style cylindrical, conical or shortened; bracteoles usually two; inflorescence variable. Fruit indehiscent, nut-like or often drupaceous. Leaves alternate or opposite, entire, sometimes scale-like; stipules none. The order comprises twenty-eight genera, and nearly 220 species. Illustrative genera are: *Exocarpus, Grubbia, Santalum* and *Thesium.*

SANTALUM (from the Persian *Chandal,* which, in turn, is derived from the Sanscrit *Chandana,* the name of the tree). SYN. *Sirium.* ORD. *Santalaceæ.* A genus embracing about eight species of stove, evergreen, glabrous trees or shrubs, closely related, natives of the East Indies, the Malayan Archipelago, Australia, and the Pacific Islands. Flowers often larger than in allied genera, in small, axillary or terminal, trichotomous panicles, usually shorter than the leaves, and sometimes almost reduced to simple racemes; perianth tube campanulate or obovate, the lobes four, or rarely five, with a tuft of hairs inside behind each stamen. Leaves opposite or rarely alternate, petiolate, entire, coriaceous or slightly fleshy, penniveined, but the midrib only conspicuous. Two of the species have been introduced, one of which (*S. album*) yields the Sandal Wood of India. The cultivation of this plant in gardens is not easy. It is supposed to be more or less parasitical on the roots of other plants which grow near it. In India it is extensively grown, but it thrives only under peculiar conditions. Some authorities deny that it is at all parasitical. At Kew, young plants of *S. album* are inserted in very sandy loam, and grown in a stove temperature. The other introduced species will thrive under similar conditions.

S. album (white). *fl.* reddish within, campanulate, four-fid; pedicels nearly equalling the perianth tube; panicles terminal and lateral, many-flowered. May. *l.* ovate-elliptic, acute at base, acute or rarely obtuse at apex, 1½in. to 2½in. long, sometimes varying on the same branch from ovate to ovate-lanceolate, pale beneath, membranous. *h.* 15ft. East Indies, 1804. Tree. The wood is white or citron-coloured and sweet-scented when dry, and it is much esteemed in India as a perfume. (B. M. 3235.)

S. a. myrtifolium (Myrtle-leaved). *l.* narrower and paler beneath than in the type. Shrub or small tree.

S. obtusifolium (obtuse-leaved). *fl.* red, few, in small, shortly pedunculate, axillary racemes or cymes, the short pedicels or lateral branches rarely bearing two or three flowers. June. *l.* opposite, or the uppermost ones rarely alternate, linear-oblong, lanceolate, or broadly oblong, obtuse, 1in. to 2in. long, rather thick, the margins often revolute when drying. *h.* 6ft. Australia, 1823. A slender shrub, of livid aspect.

SANTOLINA (probably from *Santonica,* an old name given by Pliny to a kind of Wormwood, found among the Santones, a Gallic tribe). Lavender Cotton. ORD. *Compositæ.* A genus consisting of about eight species of sweet-smelling, mostly hardy sub-shrubs, inhabiting the Mediterranean regions. Flower-heads yellow (or whitish?), mediocre or small, long-pedunculate; involucre ovoid, sub-globose, or scarcely hemispherical; the bracts many-seriate, appressedly imbricated; receptacle slightly convex; florets regular; achenes glabrous, three, four, or rarely five-jointed. Leaves alternate, pectinate, or clustered and pinnatisect. A selection from the species introduced is given below. *S. Chamæcyparissus* has long been known in gardens. For culture, *see* **Achillea.**

S. Chamæcyparissus (Chamæcyparis-like). Common Lavender Cotton. *fl.-heads* resembling those of a Chamomile divested of its white rays, solitary at the ends of the wiry twigs. July. *l.* small, linear, thickly set on the twigs, furnished with four to six rows of short, obtuse teeth, and, as well as the stems, clothed with hoary pubescence. *h.* 1ft. to 2ft. South Europe, 1573.

S. C. incana (hoary).* A pretty, dwarf-growing plant, useful for divisional lines or edging; its slender, twig-like growths and knotty leaves are densely covered with silvery tomentum.

Santolina—*continued.*

S. C. squarrosa (squarrose). *fl.-heads* smaller than peas. *l.* slightly hoary. Stem erect.

S. C. tomentosa (tomentose). *fl.-heads* larger than peas; involucre somewhat mealy.

S. rosmarinifolia (Rosemary-leaved). *fl.-heads* globose or hemispherical; involucral scales highly glabrous, sub-carinate, acute. August. *l.* linear, slightly acute; lower ones tubercled on the margins; upper ones flat, entire or slightly denticulate at apex. Branches straight, erect, one-headed. *h.* 2ft. South Europe, 1683. (S. E. B. 62.)

SANVITALIA (so-called after the Sanvitali family, of Parma). SYN. *Lorentea.* ORD. *Compositæ.* A small genus (three or four species) of stove or half-hardy, annual or perennial herbs, inhabiting the Mexican region. Flower-heads yellow or whitish, rather small or mediocre, the disk often purplish; ray florets one or two-seriate; involucral bracts in two or three series; receptacle flat or convex; achenes glabrous, those of the ray having three arms. Leaves all opposite, entire. *S. procumbens* is in cultivation. It is a half-hardy, much-branched trailer, thriving in a mixture of light, sandy loam and peat, and may be increased by seeds.

S. procumbens (procumbent). *fl.-heads* small, like those of a species of *Rudbeckia*, having a bright yellow ray and a dark disk; outer achenes of the disk muricated. July. *l.* ovate, entire. Stem procumbent or diffuse. 1798. (B. R. 707.) There is also a double-flowered variety.

SAP. The fluid that exists in living plants, for the most part inclosed in the cells of which they are built up. It varies much in composition in different parts of the same plant; and the nature of these variations must be explained. A plant growing in the soil pushes out roots and rootlets, and through them sucks in, from the damp earth, a large amount of water. This passes into the hairs of the root by gradual absorption, carrying with it some mineral compounds, such as common salt, phosphates, &c., in solution. These mineral substances are present in only very small proportions in the solutions; but, in course of time, a considerable quantity thus enters the plant, if the substances occur in the soil in forms suitable for absorption by plants. The water, with its dissolved mineral substances passes from the root-hairs into the root, and thence into the stem, remaining little changed in composition, and bearing the name of *Crude Sap.* This crude Sap flows upwards in the younger (*i.e.*, outer) layers of wood of the stem, and in some plants it is possible to tap the stream, and to obtain nearly pure, and quite drinkable, water, when a hole is bored deep enough to reach the young layers of wood. The crude Sap is conveyed to the green parts of the plant; and there, especially in the leaves, it undergoes great changes. A quantity of the water is given off from the leaves by evaporation or transpiration, rendering the solutions denser in the leaves than in the stems. But the great change brought about in the Sap in the green parts of plants consists in the formation in these parts of various substances, of which the most easily detected is *starch.* This is present in solid grains in the cells containing the green substance or chlorophyll, when the green parts have been exposed for an hour to the action of daylight or to strong artificial light. Several substances, that in composition resemble starch to some extent, are formed in the cells containing chlorophyll, and some of them remain in solution in the cell Sap, while others assume a solid form. Other substances, resembling protoplasm in general composition, are also formed in the green parts of plants, and probably also in other parts; and these, too, are often dissolved in the Sap. Owing to the loss of water by evaporation, and to the addition of these new organic products, the Sap becomes "elaborated," being heavier and thicker than the crude Sap. It passes from the parts in which it was elaborated to all parts where nourishment is required, whether to supply the material consumed during

Sap—*continued.*

growth, or to allow of the formation of new structures at the growing points of stems, and in the growth of leaves, flowers, and fruits. In many perennial plants, a large proportion of the new products is also transferred from the leaves to the stems, or to underground store-houses, *e.g.*, tubers of Potato, roots of Parsnip and Turnip, bulb-scales of Lilies, &c. There are thus descending currents of elaborated Sap, in Dicotyledons, usually outside of the ascending currents of crude Sap. The elaborated Sap descends by two chief routes: the first, down which pass dissolved starch and compounds of a similar kind, is believed to be through the *cellular* tissues of the bark, and, to some extent, the medullary rays and the pith; the second route, down which the protoplasmic substance passes, is believed to be the soft-bast, or innermost layer of the bark. Down this the

FIG. 415. A, SAPERDA POPULNEA, natural size; B, BRANCH OF POPLAR, showing Ravages committed by the Insect. (Page 358.)

latter stream flows, especially by means of the "sieve-tubes"—slender tubes of long cells, end to end, that are separated, only partially, by sieve-like cross walls, the openings in which allow the protoplasm to pass from cell to cell. A practical result of the situation of the descending current is that if a ring of bark is removed, or a tight ring of any material (*e.g.*, wire) is bound round a branch of any Dicotyledon of ordinary structure (*e.g.*, an Apple-tree), the elaborated Sap is prevented from passing downwards; a thickened border is produced above the obstruction, and the crop of fruit on the branch is increased, since it gets *all* the food produced in the leaves of the branch, while duly supplied with

Sap—*continued.*

crude Sap through the wood below the ring, which has been left uninjured. This process of ringing does not succeed in a Monocotyledon, or in a Dicotyledon with fibro-vascular bundles scattered among cellular pith, and in which the downward flow of Sap consequently remains unchecked, such as the species of Pepper (*Piper*). The causes of the upward flow of crude Sap are chiefly two, viz.: (1) in early spring, when growth begins, the absorption of fluid by root-hairs, probably due to chemical changes in the cell contents; and (2) afterwards, the free evaporation from the leaves, drawing fresh Sap upwards to supply what has been lost. Other forces also assist in a lesser degree; but to these reference need not now be made.

SAPERDA. A genus of Beetles, belonging to those that possess long antennæ, and a long, rather narrow body. The genus is recognised by the following group of peculiarities: The wing-cases reach to the hinder end of the body, which is cylindrical; the thorax has not a spine on either side; the antennæ have eleven joints; and the tasters have a long, sharp end-piece. The beetles vary from about ⅓in. to 1¼in. in length, and are mostly black, or nearly so. A good many British species have been described; but the most hurtful are those which attack Poplars, Aspens, and Willows. The larvæ feed in the wood of the branches, and sometimes cause distortions and swellings of the latter. The only treatment applicable is to cut off and destroy the branches swollen and tenanted by the insects. Fig. 415 (page 357) shows *S. populnea* (which is one of the most destructive species), and the injury inflicted by it on Poplars.

SAPINDACEÆ. A natural order of trees, shrubs, or under-shrubs, rarely herbs, dispersed over the whole globe, but most numerous in tropical regions. Flowers usually polygamo-dicœcious, variously coloured and disposed, generally small for the size of the plant, inodorous; sepals four or five, very rarely more or none, free or more or less connate, often unequal, imbricated; petals wanting or three to five, rarely more, the dorsal one often wanting, often scaly or bearded within, imbricated; disk variable, complete or incomplete, sometimes unilateral, very rarely deficient; stamens usually eight, rarely five or ten (very rarely two, four, twelve, or indefinite), usually hypogynous and inserted within the disk, rarely on its head or around the base; filaments usually elongated. Fruit capsular or indehiscent, drupaceous, baccate, or coriaceous, entire or lobed, rarely composed of two or three samaras. Leaves often evergreen, alternate, exstipulate or rarely stipulate, compound, abruptly pinnate; leaflets variable, in a few cases pellucid-dotted; petioles sometimes winged. Several of the species produce edible fruits, and others furnish valuable timber. The order comprises from 600 to 700 species, which are classified, by Bentham and Hooker, in genera and sub-orders as follows: *Acerineæ*, 3 genera; *Dodonææ*, 6; *Melianthеæ*, 3; *Sapindeæ*, 59; *Staphyleæ*, 3—showing a total of seventy-four genera. Examples: *Acer*, *Dodonæa*, *Melianthus*, *Sapindus*, and *Staphylea*.

SAPINDUS (name altered from *Sapo-indicus*, Indian Soap; the aril which surrounds the seeds of *S. Saponaria* is used as soap in America). ORD. *Sapindaceæ*. A genus consisting of some forty species of tropical, sometimes slightly climbing trees and shrubs. Flowers regular, in terminal or axillary racemes or panicles; sepals and petals four or five; stamens eight to ten. Leaves alternate, exstipulate, simple and one-foliate or abruptly pinnate; leaflets entire or very rarely serrated. The species are of botanical and economic interest only. The hard, round, black seeds of some members of the genus are used for making rosaries, necklaces, bracelets, &c. One or two of the species have edible outer coverings to the fruits, but the seeds are poisonous.

SAPIUM (an old Latin name, originally given by Pliny to a resinous Pine; alluding to the unctuous exudation from the wounded trunk). SYNS. *Carumbium*, *Stillingfleetia*, *Triadica*. ORD. *Euphorbiaceæ*. A genus comprising about twenty-five species of stove, evergreen, often glabrous trees or shrubs, broadly dispersed over the warmer regions of the globe. Flowers (? always) monœcious, apetalous, the males often three to a bract, the females many at the base of the spikes; spikes or racemes terminal, solitary, or in one species several, paniculate. Leaves alternate, petiolate, entire, or rarely toothed, penniveined; petioles often biglandular at apex. A few of the species have been introduced, but they are now probably lost to cultivation.

SAPODILLA OR SAPOTILLA PLUM. *See* **Sapota Achras.**

SAPONARIA (from *sapo*, soap; the leaves of *S. officinalis* form a lather, which much resembles that of soap, and is similarly efficacious in removing grease-spots, &c.) Fuller's Herb; Soapwort. Including *Vaccaria*. ORD. *Caryophylleæ*. A genus comprising about thirty species of hardy or half-hardy herbs, sometimes annual and with the habit of *Gypsophila*, sometimes biennial or perennial and resembling the species of *Silene*; they are natives of Europe (mostly Southern), the Mediterranean region, and extra-tropical Asia. Calyx ovoid or oblong-tubular, five-toothed, obscurely nerved; petals five, with a narrow claw, and an entire or emarginate blade, scaly or naked at base; stamens ten. Radical leaves spathulate; cauline ones narrower. The species described below are very ornamental. *S. ocymoides* is particularly well adapted for decorating rockwork. *S. cæspitosa* and *S. lutea* thrive in a compost of sand, loam, and peat, with good drainage in the pots. All are readily propagated by seeds, or by division. The hardy annual and biennial kinds simply require to be sown in the open border.

S. cæspitosa (tufted). *fl.* rose-coloured, somewhat umbellate calyx profoundly lobed; petals emarginate at the apex, with bifid appendages in the throat. July and August. *l.* linear, glabrous, almost all radical, scarcely toothed. *h.* 3in. to 6in. Pyrenees, 1824. Half-hardy perennial. (G. C. n. s., xv. 501; R. G. 815.) SYN. *S. elegans.*

S. calabrica (Calabrian).* *fl.* of a beautiful rose-colour, axillary, solitary; petals orbicular, narrowed at the base. August. *l.* obovate-spathulate, usually one-nerved, smooth or slightly pubescent, ciliated on the margins. Stem erect, dichotomously branched. *h.* 6in. to 12in. Calabria, 1830. Hardy annual. (R. G. 11; S. B. F. G. ser. ii. 79.)

S. elegans (elegant). A synonym of *S. cæspitosa.*

S. glutinosa (glutinous). *fl.* blood-coloured, panicled, in corymbose bundles; calyx long, terete; petals minute, bidentate at apex, crowned with scales in the throat. June and July. *l.* ovate, three-nerved. Stem erect, branched. *h.* 1½ft. Eastern Europe, &c., 1817. Hardy biennial. (B. M. 2855.)

S. lutea (yellow). *fl.* capitate, involucrate; calyx woolly, with short lobes; petals yellow, obovate, entire; stamens violaceous. June to August. *l.* linear, ciliated at the base, almost all radical. *h.* 3in. to 6in. Alps, 1804. Half-hardy perennial.

S. ocymoides (Basil-like).* Rock Soapwort. *fl.* red or pink, in panicled bundles; calyx purple, cylindrical, villous. May to August. *l.* ovate-lanceolate, generally one-nerved. Stems dichotomous. Switzerland, Italy, &c., 1768. An elegant, hardy, perennial trailer, well suited for the ornamentation of rockwork. (B. M. 154; J. F. A. 23.)

S. officinalis (officinal).* Bouncing Bet; Common Soapwort, &c. *fl.* lilac or white, 1in. in diameter; petals obcordate; cymes in panicled corymbs. August and September. *l.* oblong-lanceolate, 2in. to 4in. long, three-ribbed. Stem straight, ascending, 1ft. to 3ft. high. Europe (apparently naturalised in Britain), temperate Asia. Hardy perennial, with a white, fleshy, creeping root-stock. (F. D. 543; Sy. En. B. 197.) *S. hybrida* is a variety with a gamopetalous corolla and connate upper leaves.

S. Vaccaria (Cow-herb). *fl.* red, paniculate; calyx pyramidal, smooth, five-angled; bracts membranous, acute. July and August. *l.* ovate-lanceolate, sessile. *h.* 1ft. to 2ft. Central Europe, 1596. Annual. (B. M. 2290.)

SAPOTA (the native name). SYN. *Achras.* ORD. *Sapotaceæ.* A monotypic genus. The species is a very large, stove, evergreen tree, with milky juice. It thrives in rich, loamy soil, and may be increased by cuttings.

Sapota—*continued.*

S. Achras (Achras). Bully-tree; Sapodilla or Sapotilla Plum. *fl.* whitish, rather large, pedicellate in the axils; calyx segments six, in two distinct series; corolla broadly sub-urceolate, six-lobed. May. *fr.* very luscious, resembling an apple in shape. *l.* petiolate, clustered at the tips of the branches, 3in. to 4in. long, elliptic-oblong, acute, glabrous; primary veins thick; petioles downy. Branches numerous, forming a spreading top. *h.* 10ft. to 50ft. West Indies and Central America, 1731. (B. M. 3111, 3112.) The correct name of this tree is *Achras Sapota*.

SAPOTA (in part), of A. de Candolle, R. Brown, &c. Synonymous with **Sideroxylon** (which *see*).

SAPOTACEÆ. A natural order of trees or shrubs, with milky juice, inhabiting tropical and sub-tropical regions. Flowers regular, hermaphrodite, or very rarely polygamous by abortion, not large, glomerate or fascicled at the nodes or in the axils, rarely solitary or fascicled; calyx inferior, persistent or deciduous; corolla gamopetalous, the tube campanulate or urceolate, or rarely elongated, the limb equal, the lobes equalling in number, or twice or four times as many as, the sepals; stamens affixed to the tube of the corolla, in one or two series, the filaments erect; anthers two-celled; pedicels minutely bracteate or ebracteate. Berry indehiscent, usually two to many-celled. Leaves alternate, very rarely sub-opposite, coriaceous or rarely membranous, entire, penniveined, exstipulate, or rarely with small, caducous stipules. "Several species of this order are useful to man. The fruits of *Lucuma mammosa* (the Marmalade of the West Indies) are a very agreeable food, as are those of *Achras Sapota* and various species of *Chrysophyllum*, which are much sought after in the Antilles; those of *Bassia* and *Imbricaria*, Asiatic genera, are also edible. . . . . Other *Sapotaceæ*, both Asiatic and African (*Sideroxylon*, *Argania*), are employed for building purposes, on account of the hardness of the wood, whence the name of Iron-wood" (Le Maoût and Decaisne). *Dichopsis gutta*, a Malayan tree, furnishes Gutta Percha. The order comprises about two dozen genera, and 320 species. Examples: *Chrysophyllum, Lucuma, Sideroxylon.*

SAPOTA, WHITE. A common name for *Casimiroa edulis*.

SAPPAN-WOOD. A common name for *Cæsalpinia Sappan*.

SAP WOOD. The new wood of an exogenous stem.

SARACA (said to be from *Sarac*, the native American name of the plant). Syn. *Jonesia*. Ord. *Leguminosæ*. A genus consisting of four or five closely-related species of unarmed, stove trees (or tall, climbing shrubs ?), natives of tropical America. Flowers yellow, rose, or scarlet, racemose; calyx segments four, petaloid, closely imbricated; petals absent; stamens three to nine, free; racemes disposed in short, much-branched, often lateral panicles; bracts small, deciduous. Pods oblong or elongated, two-valved. Leaves abruptly pinnate; leaflets coriaceous, often few-jugate; stipules small, caducous. The best-known species are described below. For culture, *see* **Brownia.**

S. inclinata (curved downwards). *fl.* yellowish-orange, disposed in fascicled panicles. *l.* pinnate, with six to eight pairs of oblong leaflets, which assume, when young, a beautiful reddish tint. Java and Sumatra. A very elegant species, closely allied to *S. indica*.

S. indica (Indian). *fl.* very rich orange, with much-exserted, crimson stamens. Summer. *l.* opposite, abruptly pinnate, with three to five pairs of oblong, shining, firm leaflets. India, 1796. (B. M. 3018, under name of *Jonesia Asoca*.)

SARACHA (named in honour of Isidore Saracha, a Benedictine monk, much attached to botany; he enriched the Royal Gardens at Madrid with many rare plants). Syns. *Bellinia, Jaltomata*. Ord. *Solanaceæ*. A genus consisting of about a dozen species of diffuse or sub-erect, greenhouse or hardy herbs, natives of Western America, from Bolivia to Mexico. Calyx broadly campanulate, shortly five-fid; corolla sub-rotate or very broadly campanulate, with a deeply five-fid limb; stamens five; peduncles short. Leaves entire or broadly sinuate-toothed. The two species mentioned below are hardy annuals, thriving in ordinary garden soil. Seeds should be sown in the open border, during spring.

Saracha—*continued.*

S. stapelioides (Stapelia-like). *fl.* pale yellow, with five reddish-brown, yellow-veined blotches; corolla rotate, the lobes rounded and apiculate; peduncles axillary, solitary or rarely twin, one-flowered. Summer. *l.* slightly cordate or rounded at base, ovate, scarcely acuminate, entire or sinuate-toothed, scattered, the lower ones solitary, the upper ones twin. Stem erect, herbaceous or suffruticose at base. *h.* 1½ft. 1865. Greenhouse. (R. G. 465.)

S. umbellata (umbel flowered). *fl.* cream-coloured or greenish white; corolla plicate; umbels pedunculate, seven to ten flowered, axillary, solitary. June and July. *l.* ovate, wrinkled, entire, shining, acute, scabrous; floral ones twin. *h.* 2ft. to 4ft. Peru, 1822. (S. B. F. G. 85.)

SARCANTHUS (from *sarx*, *sarkos*, flesh, and *anthos*, a flower; referring to the substance of the flowers). Ord. *Orchideæ*. A genus including about a score species of stove, epiphytal orchids, inhabiting the East Indies, South China, and the Malayan Archipelago. Flowers often yellowish-green, purplish within, small, shortly pedicellate; sepals and petals free, sub-equal, spreading, slightly fleshy; lip affixed to the base of the column, spreading, spurred at base, the lateral lobes short, ear-like, or oblique, the middle one ovate, oblong, or lanceolate; column oblong, sub-terete; pollen masses four; bracts small; peduncles lateral, often slender, simple or paniculately branched. Leaves distichous, coriaceous or fleshy, flat or terete. Stem leafy, not pseudo-bulbous. These plants should be grown in teak-baskets suspended near the glass in a moist stove. They thrive best in peat fibre and sphagnum, with a few lumps of charcoal about their roots. The species best known in gardens are here described.

S. arietinus (ram's-head). *fl.* greenish, with a rosy lip, having the medial lobe triangular and yellowish, and the side lobes purplish, numerous. *l.* straight, terete, as thick as a quill. Assam, 1869. A remarkably odd, stiff-looking plant.

S. belophorus (hammer-bearing). *fl.* of an ochreous colour, with two longitudinal, purple-brown stripes on the sepals, petals, and lip, small. *l.* ligulate, equally bilobed, undulated. 1883. A small species.

S. chrysomelas (dark-golden). *fl.* yellowish, having the disk of the sepals and petals blackish-purple, borne in a large panicle. *l.* broad, lorate, unequally bilobed. Moulmein, 1869.

S. erinaceus (hedgehog like). *fl.* white, with a prettily rose-tinted lip, numerous; spikes pendent, axillary, the rachis red and hairy, as are also the ovaries. Moulmein, 1867. (B. M. 5630.) Syns. *Aërides dasypogon*, *A. rubrum*.

S. filiformis (thread-like). *fl.* very small; sepals and petals chocolate-coloured, reflexed; lip pale yellow, tipped with pink; raceme seven or eight-flowered. *l.* filiform. East Indies, 1862. Allied to *S. teretifolius*. (B. M. 4639.)

S. flexus (zigzag panicled). *fl.*, sepals yellowish-brown, tipped outside with reddish brown; petals yellowish-brown; spur of the lip whitish-yellow, the blade at first of the same colour, afterwards yellow; panicle zigzag. *l.* short, ligulate, bilobed. Borneo, 1881. A robust plant.

S. guttatus (spotted). A synonym of *Rhynchostylis retusa*.

S. Hincksianus (Hincks'). *fl.* smaller; sepals and petals green, with three equal, red stripes; side lobes of lip blunt, and callus with medium angles; spur longer and more attenuated. Otherwise, this plant resembles *S. teretifolius*, but is more slender than that species. Native country uncertain. 1878.

S. laxus (loose). *fl.* dirty white, somewhat fleshy; sepals oblong blunt acute; petals linear ligulate, blunt acute, lateral lacinæ of lip erect, oblong, lobed, the middle one triangular, spatulate, hollowed out; spur conical; raceme long, many-flowered, lax, hairless. *l.* close together, few, short, very thick, oblong, bluntly bilobed or bidentate, keeled on the under side, and with numerous purple spots. Stems very short. Moulmein, 1869. (Ref. B. 106.)

S. Lendyanus (Lendy's). *fl.* borne in a small, loose panicle, sepals and petals greenish, with a purple disk; lateral lobes of the lip orange, with two purple lines, roundish, with introrse angles; middle lobe white, with purple spots, oblong; spur as long as the purple ovary. *l.* linear, blunt, bilobed. Saigon, 1864.

S. macrodon (long-toothed). *fl.* yellowish, streaked with purple; sepals and petals oblong, nearly straight; lip trifid; bracts very minute; raceme elongated, loosely many-flowered. *l.* abbreviated, oblong-ligulate, toothed at apex. India, 1872. A small and not particularly ornamental species.

S. mirabilis (wonderful). *fl.* yellowish, with a purplish spur,

Sarcanthus—*continued.*

small, disposed in an erect, racemose panicle 1½ft. long. *l.* 6in. long. India, 1878. A plant of no particular merit.

S. paniculatus (panicled). *fl.* yellowish; sepals and petals marked with two blood-coloured stripes, linear-oblong, undulated; blade of lip two-horned; spur straight; spike paniculate. *l.* long-lorate, obliquely bilobed and obtuse at apex. China. SYN. *Aërides paniculatum* (B. R. 220).

S. Parishii (Parish's). *fl.* yellow, with a rose-coloured lip, small, produced in slender spikes. *l.* lorate, obliquely tipped. Moulmein, 1861. An inconspicuous plant. (B. M. 5217.)

S. rostratus (beaked). *fl.* borne in a simple, horizontal spike equalling the leaves; sepals and petals yellowish-green, with sanguineous margins; lip violet, produced into a beak. *l.* lanceolate, acute, flat, sub-recurved. China, 1824. (L. C. B. 39B.)

S. striolatus (slightly striated). *fl.*, sepals and petals orange-coloured, with two cinnamon, parallel, longitudinal bars; lower part of the spur white, the upper part of the lip orange. Philippine Islands, 1882.

S. succisus (lopped-off). *fl.*, sepals and petals yellowish-green, purple in the middle, obtuse; lip yellow, blood-coloured at apex; spike simple, horizontal or deflexed, longer than the leaves. *l.* oblong, slightly undulated, præmorse. China, 1824. (B. R. 1014.)

S. teretifolius (terete-leaved). *fl.*, sepals and petals yellowish-green, marked with sanguineous veinings, obtuse, reflexed; lip white, the margins of the throat violet; spur straight, obtuse, pubescent within; spike simple, horizontal, equalling the leaves. *l.* terete. China, 1819. (B. M. 3571.) SYN. *Vanda teretifolia* (L. C. B. 6).

S. Williamsonii (Williamson's). *fl.* of a pretty amethyst-colour, disposed in spreading panicles. *l.* pale green, terete. Assam. 1865. An elegant little plant, resembling a diminutive *Vanda teres.*

SARCOCAPNOS (from *sarx, sarkos*, flesh, and *Kapnos*, the Greek name for Fumitory; the species have fleshy leaves). ORD. *Papaveraceæ.* A small genus (four species) of hardy, dwarf, tufted, perennial herbs, inhabiting the Spanish Peninsula or North Africa. Flowers white, yellow, or purplish; sepals two, scale-like; petals four, erecto-connivent, one of the two outer ones spurred at base, the other flat, the inner ones narrow and cohering at apex; stamens six; racemes terminal, few-flowered. Leaves dissected; segments usually broad and rather thick. *S. enneaphylla*, the only species introduced, thrives in the open border or on rockwork. It may be readily increased by seeds, or by cuttings.

S. enneaphylla (nine-leaved). *fl.* yellow, marked with purplish above, small, in short racemes of about ten. June. *l.* ternately parted, on long, slender petioles; leaflets roundish-ovate, sometimes cordate at base, mucronulate at apex, the terminal one usually larger. Stems 2in. to 5in. high, slender, suffruticose at base. Southern Europe, &c., 1714.

SARCOCARP. The fleshy or succulent portion of a drupe, lying between the epicarp and endocarp. The term is sometimes used to generally indicate a baccate fruit.

SARCOCARPON. A synonym of **Kadsura** (which *see*).

SARCOCAULON (from *sarx, sarkos*, flesh, and *caulon*, a stem; alluding to the fleshy stems). ORD. *Geraniaceæ.* A genus comprising three species of divaricately-branched, fleshy or succulent, rigid, greenhouse herbs or sub-shrubs, armed with spines formed out of persistent and hardened petioles; they are confined to South Africa. Flowers purple, on axillary, one flowered peduncles; sepals five, imbricated; petals five, hypogynous, imbricated; stamens fifteen. Leaves small, on the spinous petioles, or tufted or solitary in the axils of the thorns. The species thrive best in a compost of loam, peat, and leaf mould or sand. Propagation may be readily effected by young cuttings, inserted in sand, under a glass; or by cuttings of the roots.

S. Burmanni (Burmann's). *fl.* 1½in. to 2in. broad; petals twice as long as the mucronate sepals; stamens five long and ten shorter. May. *l.* obovate-cuneate, ½in. to ¾in. long, inciso-crenate, glabrous or downy, fleshy, on short petioles. *h.* 1ft. 1800. (B. M. 5729.)

S. L'Heretieri (L'Heritier's). *fl.*, petals not much exceeding the cuspidate, attenuated sepals. May. *l.* obovate or obcordate, acute or obtuse, entire, glabrous. *h.* 1ft. 1790. This is often confounded with *S. Patersoni.*

Sarcocaulon—*continued.*

S. Patersoni (Paterson's). *fl.* smaller than in either of the other species; petals not twice as long as the obtuse, mucronate sepals. May. *l.* cuneate or obcordate, obtuse or mucronulate, entire, glabrous. *h.* 2ft. 1827.

SARCOCEPHALUS (from *sarx, sarkos*, flesh, and *kephale*, a head; alluding to the fleshy heads of fruit). Guinea Peach. SYN. *Cephalina.* ORD. *Rubiaceæ.* A genus comprising about eight species of stove shrubs or trees, sometimes climbing, with terete or obtusely quadrigonal branchlets; they inhabit tropical Asia, Africa, and Australia. Flowers white or yellow; calyx limb truncate, obscurely five or six-toothed; corolla tubular-infundibuliform, the limb of five or six rounded lobes; heads terminal and axillary, pedunculate, sometimes paniculate, ebracteate. Fruit globose, one-celled. Leaves opposite, petiolate, sub-coriaceous; stipules interpetoliar, mediocre and triangular or ample and obovate, deciduous. *S. esculentus* is an interesting, climbing shrub, seldom seen in collections. It should be grown in a compost of loam, peat, and sand. Cuttings will root, if inserted in sand, under a glass, in heat. *S. cordatus* requires similar treatment.

S. cordatus (heart-shaped). *fl.* yellow, in dense, globular heads above 1in. in diameter without the styles; corolla about ¼in. long. May. *l.* broadly ovate, obtuse, rounded, cuneate, or broadly heart-shaped at base, 4in. to 10in. long, sometimes softly pubescent beneath; stipules large, quickly deciduous. *h.* 10ft. or more. Australia and India, 1820. A handsome tree. SYN. *Nauclea coadunata.*

S. esculentus (edible). Guinea, Negro, or Sierra Leone Peach. *fl.* pinkish, in short, terminal, pedunculate or sessile heads. July. *fr.* in heads the size of a peach. *l.* shortly petiolate, roundish-oval, shining above, pubescent in the axils of the veins beneath; stipules solitary, triangular. A tall tree, sometimes a scandent shrub, about 20ft. high. Sierra Leone, 1822.

SARCOCHILUS (from *sarx, sarkos*, flesh, and *cheilos*, a lip; alluding to the fleshy lip). SYNS. *Dendrocolla, Thrixspermum.* Including *Camarotis, Gunnia, Micropera*, and *Ornitharium.* ORD. *Orchideæ.* A genus embracing some thirty species of stove, epiphytal, caulescent, not pseudo-bulbous orchids, natives of the East Indies, the Malayan Archipelago, the Pacific Islands, and Australia. Flowers mediocre or small (in *S. Calceolus* showy); sepals and petals spreading, the lateral sepals often more or less adnate to the foot of the column; lip without a spur, three-lobed, the lateral lobes petaloid or tooth-like, the middle one variable, fleshy; column erect; pollen masses two, globose, or four more or less connate in a pair; peduncles lateral, simple or rarely branched. Leaves coriaceous or fleshy, oblong or linear, distichous, or sometimes very few or deficient. "In many respects, the genus resembles *Dendrobium*, but differs much from it in the form of the pollen masses, in their attachment to a caudicle, and in the seed capsule and seed" (Fitzgerald). The two species of this genus most common in gardens are *S. Fitzgeraldi* and *S. Hartmanni.* These should be grown in a greenhouse temperature, along with such plants as *Odontoglossum citrosmum.* They like a moist atmosphere, subdued light, and plenty of water at the root always. Peat and sphagnum are the best mixture for them. The species known in gardens are here described.

S. Calceolus (slipper-like). *fl.* white; sepals and petals fleshy, oblong, acute; middle lobe of lip slipper-like, but closed up, the lateral lobes ascending, triangular; peduncles short, two-flowered. *l.* oblong, fleshy, obliquely emarginate, obtuse. Stem elongated. Manilla, 1844. (B. R. 1846, 19.)

S. cochinchinensis (Cochin China). *fl.* yellowish, glutinous; sepals striped with brown over the middle nerves outside, and with some dark yellow patches under the column; racemes small. *l.* rather narrow, linear-ligulate, bilobed at apex. Cochin China, 1877. SYN. *Camarotis cochinchinensis.*

S. falcatus (sickle-shaped). *fl.* white, usually three or four, distant; lateral sepals adnate to the basal projections of the column; peduncles scarcely exceeding, sometimes shorter than, the leaves. *l.* oblong, often falcate, 2in. to 4in. long. Stems 2in. to 3in. high. Australia, 1821. (B. R. 1832.)

S. Fitzgeraldi (Fitzgerald's).* *fl.* snowy-white, spotted with rich lake or maroon; lip not half the length of the sepals, the lateral

Sarcochilus—*continued.*

lobes falcate; peduncle, with the raceme, 6in. to 12in. long. *l.* 3in. to 6in. long. Australia, 1877. Habit that of *S. falcatus.*

S. Freemanii (Freeman's). *fl.* yellow, with brownish spots and streaks, numerous in a raceme; sepals very long, narrow-linear; petals a little shorter than the sepals; lip small, saccate, tridentate. *l.* ligulate, here and there undulated, bidentate, 6in. to 7in. long, 1¼in. wide. Assam, 1876. An elegant, dwarf species. SYN. *Thrixspermum Freemanii.*

S. Hartmanni (Hartmann's). *fl.* beautiful creamy-white, rather small; sepals and petals with brick-red spots at base; side laciniæ of the lip spotted and streaked with brick-red, semi-falcate or oblong, the middle lacinia yellow; callus yellow, with red spots; raceme dense. *l.* generally four, rather thick, ligulate, bidentate. Queensland, 1877. SYN. *Thrixspermum Hartmanni.*

S. ionosmum (Violet-scented). *fl.* about 1in. across, flat, in an open panicle, with a pleasant, Violet-like scent; sepals and petals yellow, blotched with cinnamon-brown, obovate, obtuse; lip white, with a few red streaks, the basal lobes acute and much smaller than the middle one. *l.* ensiform. Manilla, 1844. (B. R. xxxiii. 41.)

S. olivaceus (Olive-like). *fl.*, sepals and petals dull pale purple or yellowish-brown, much contracted below the middle; lip white, streaked with red, about half as long as the sepals; racemes loose, two or three-flowered. *l.* oblong, often falcate, 2in. to 3in. long. Stems less than 1in. long. Australia.

S. pallidus (pale). *fl.* pale yellow, mediocre, eight to fifteen in a short raceme. *l.* broadly linear, arcuate, oblique at apex, somewhat three-toothed. Sylhet. SYN. *Micropera pallida.*

S. teres (terete). *fl.*, sepals and petals white, spotted, fleshy, obtuse; lip white, with a few violet stains and a deep purple, round knob at the end. *l.* ovate-oblong or oblong, unequal at apex, flat, fleshy, pale green, 5in. long, 1½in. broad. India. SYN. *Ornitharium striatulum* (L. & P. F. G. i. 117).

SARCOCOCCA (from *sarx, sarkos*, flesh, and *kokkos*, a berry; alluding to the fleshy fruits). SYN. *Lepidopelma.* ORD. *Euphorbiaceæ.* A small genus (three species) of stove or greenhouse, glabrous shrubs, natives of the East Indies and the Malayan Archipelago. Flowers monœcious, apetalous; racemes small, dense, clustered about the axils. Fruit sub-drupaceous, ovoid or globose, indehiscent. Leaves alternate, shortly petiolate, entire, coriaceous, penniveined or triplinerved. The species introduced thrive in sandy loam. Propagation may be effected by cuttings, inserted in sand, under a glass, with a little heat.

S. Hookeriana (Hooker's). *fl.* yellowish; inflorescence short, equalling the petioles, loose-flowered; bracts ovate-lanceolate. June. *l.* 2in. to 3in. long, narrow-lanceolate, acuminate, acute at base, somewhat coriaceous, slightly shining above or opaque, penninerved; petioles about ¼in. long. *h.* 1ft. to 4ft. Sikkim Himalayas. Half-hardy (hardy in the South of England).

S. saligna (Willow-like). *fl.* pale yellow; inflorescence scarcely exceeding the rather short petioles; bracts of the male peduncles ovate, acute; bracteoles oblong-ovate, acuminate. June. *l.* linear-lanceolate, long-narrowed to the base, with a very long, cuspidate acumen at apex. *h.* 4ft. Nepaul, 1820. Greenhouse. (B. R. 1012, under name of *S. pruniformis.*)

S. s. coriacea (leathery). *fl.*, inflorescence loose, nearly equalling the petioles; female peduncles twin or ternate, slender. (H. E. F. 148, under name of *Pachysandra coriacea.*)

S. s. latifolia (broad-leaved). *l.* broad or narrow ovate-lanceolate, acute at base.

SARCOCOLLA (an old name used by Pliny for a kind of gum, from *sarx, sarkos*, flesh, and *kolla*, glue; in reference to the resinous secretion from some of the species). ORD. *Penæaceæ.* A genus comprising nine or ten species of small, greenhouse, South African shrubs, with the habit and inflorescence of *Penæa.* Flowers often larger; perianth tube cylindrical, often elongated; lobes valvate, the margins recurved, nearly reduplicate. Floral leaves in the typical species coloured. Sarcocool, a gum-resin now seldom met with, is generally said to be the produce of *S. squamosa.* The species known to cultivation are here described. For culture, *see* **Penæa.**

S. imbricata (imbricated). *fl.* pink; perianth ¼in. long, the tube scarcely longer than the lobes; bracteoles oblong-linear, shorter than the obovate, mucronate bracts. June. *l.* approximate, broadly ovate, acute, four to five lines long; young ones quadrifarious, erect. *h.* 1½ft. 1824. SYN. *Penæa imbricata* (B. M. 2809).

S. squamosa (scaly). *fl.* red; bracteoles linear or linear-spathulate, ciliated, shorter than the bracts; bracts imbricated, as large as the leaves, broadly obovate, slightly mucronate, ciliated,

Sarcocolla—*continued.*

resinous, six to eight lines long and broad. June. *l.* broadly obovate, obtuse, mucronate, five to eight lines long, four to six lines broad; young ones erect; older ones spreading, mucro-glandular. *h.* 1ft. 1787. SYNS. *Penæa Sarcocolla, P. squamosa* (B. R. 106).

SARCOGLOTTIS. Included under **Spiranthes** (which *see*).

SARCOGONUM. A synonym of **Muehlenbeckia** (which *see*).

SARCOLOBUS (from *sarx, sarkos*, flesh, and *lobos*, a pod; the seed-vessels are fleshy). ORD. *Asclepiadeæ.* A small genus (two or three species) of stove, twining shrubs, natives of India and the Malayan Archipelago. Flowers small; calyx five-parted; corolla campanulate or sub-rotate, partly five-fid, the lobes twisted; corona wanting; cymes clustered. Leaves opposite, membranous or rather thick. The species are probably lost to cultivation.

SARCOPHYLLUS. Included under *Aspalathus.*

SARCOPODIUM. The species formerly classed under this name are now removed, by Bentham and Hooker, to *Bulbophyllum* and *Dendrobium.*

SARCOSTEMMA (from *sarx, sarkos*, flesh, and *stemma*, a crown; the leaflets of the inner corona are fleshy). ORD. *Asclepiadeæ.* A genus of climbing or decumbent, leafless, stove shrubs, with slightly fleshy branches, natives of tropical and sub-tropical Asia, Africa, and Australia. Eight species have been described, but the number may be reduced to four or five. Flowers rather small; calyx deeply five-fid; corolla sub-rotate, deeply five-fid, the lobes twisted; corona often duplex, the outer one annular or cyathiform, the inner one of five erect scales; cymes umbelliform, the receptacle or rachis often clavate. *S. Brunonianum*, the species best known to cultivation, requires culture similar to **Ceropegia** (which *see*). The American species formerly included in this genus are now referred to *Philibertia.*

S. Brunonianum (Brown's). *fl.* bright yellow; column very short; inner processes of the corona almost concealing the anthers; stigma very shortly conical; umbels chiefly lateral. India, 1872. (B. M. 6002.)

SARIBUS. A synonym of **Livistona** (which *see*).

SARMENTOSE. Producing long runners or sarments; *e.g.*, those of the Strawberry.

SARMIENTA (named after Mart. Sarmiento, a Spanish botanist). ORD. *Gesneraceæ.* A monotypic genus. The species is a greenhouse, glabrous shrub, creeping or climbing over trees and rocks. This wiry-stemmed plant does not always grow well under cultivation. It should be planted in soft peat, mixed with sphagnum and charcoal, and either in a small pan or orchid-basket. Healthy plants have been grown on a piece of soft Tree-fern stem. *S. repens* likes abundance of water, shade from bright sunshine, and a position near the glass in a moist greenhouse. It would thrive in a house where Lapagerias are grown.

S. repens (creeping).* *fl.* scarlet, solitary in the axils, peduncu-late; calyx free, five-parted; corolla tube elongated, swollen; limb slightly oblique, of five rounded, spreading lobes. Summer. *l.* opposite, rather small, somewhat fleshy, entire or with a few teeth. Stems slender. Chili, 1862. (F. d. S. 1646.)

SAROTES. Included under **Guichenotia** (which *see*).

SAROTHRA. Included under **Hypericum** (which *see*).

SARRACENIA (named by Tournefort, in honour of Dr. Sarrazin, of Quebec, who first sent species from North America to Europe). Indian Cup; Pitcher Plant; Side-saddle Flower; Trumpet Leaf. ORD. *Sarraceniaceæ.* A genus comprising half-a-dozen species of curious, half-hardy, herbaceous perennials, inhabiting North America. Sepals five, spreading; petals five, connivent; style expanded into a large, umbrella-shaped disk; scapes one-

Sarracenia—*continued.*

flowered, naked, with the exception of three bracteoles close to the calyx. Leaves radical, pitcher-shaped. The species require to be potted in good, fibrous peat and sphagnum, such as will not readily become sour from the large administrations of water which are necessary during the growing season. A moderately cool house, and a moist, close atmosphere, are essential to the successful culture of Sarracenias. The roots must never be allowed to get dry. Propagation may be effected by division of the crowns.

FIG. 416. UPPER PORTION OF PITCHERS AND FLOWER OF SARRACENIA DRUMMONDII.

Sarracenia—*continued.*

S. Catesbæi (Catesby's). A form of *S. flava.*

S. Drummondii (Drummond's).* *fl.* purple, 3in. long; scapes longer than the leaves. April. *l.* 2ft. long, erect, trumpet-shaped, narrowly winged; lamina erect, rounded, short-pointed, hairy within, and, like the upper portion of the tube, white, variegated with reticulated, purple veins. 1829. This species has the peculiarity of producing a second crop of pitchers late in the season, which continue fresh on the plant during the winter. See Fig. 416, for which we are indebted to Mr. Wm. Bull. (F. d. S. 560 and 1071; F. M. iv. 208; G. C. n. s., xv. p. 633, and xvi. p. 8; L. & P. F. G. 1.) SYN. *S. undulata.*

Sarracenia—*continued.*

S. D. alba (white).* *l.* at apex, as well as the lamina, beautifully shaded and reticulated with transparent white. A tall-growing, garden variety. (G. C. n. s., x. p. 281.)

S. D. rubra (red).* Not quite so tall a grower as *S. D. alba*, but like it in other respects, except that the markings are bright red.

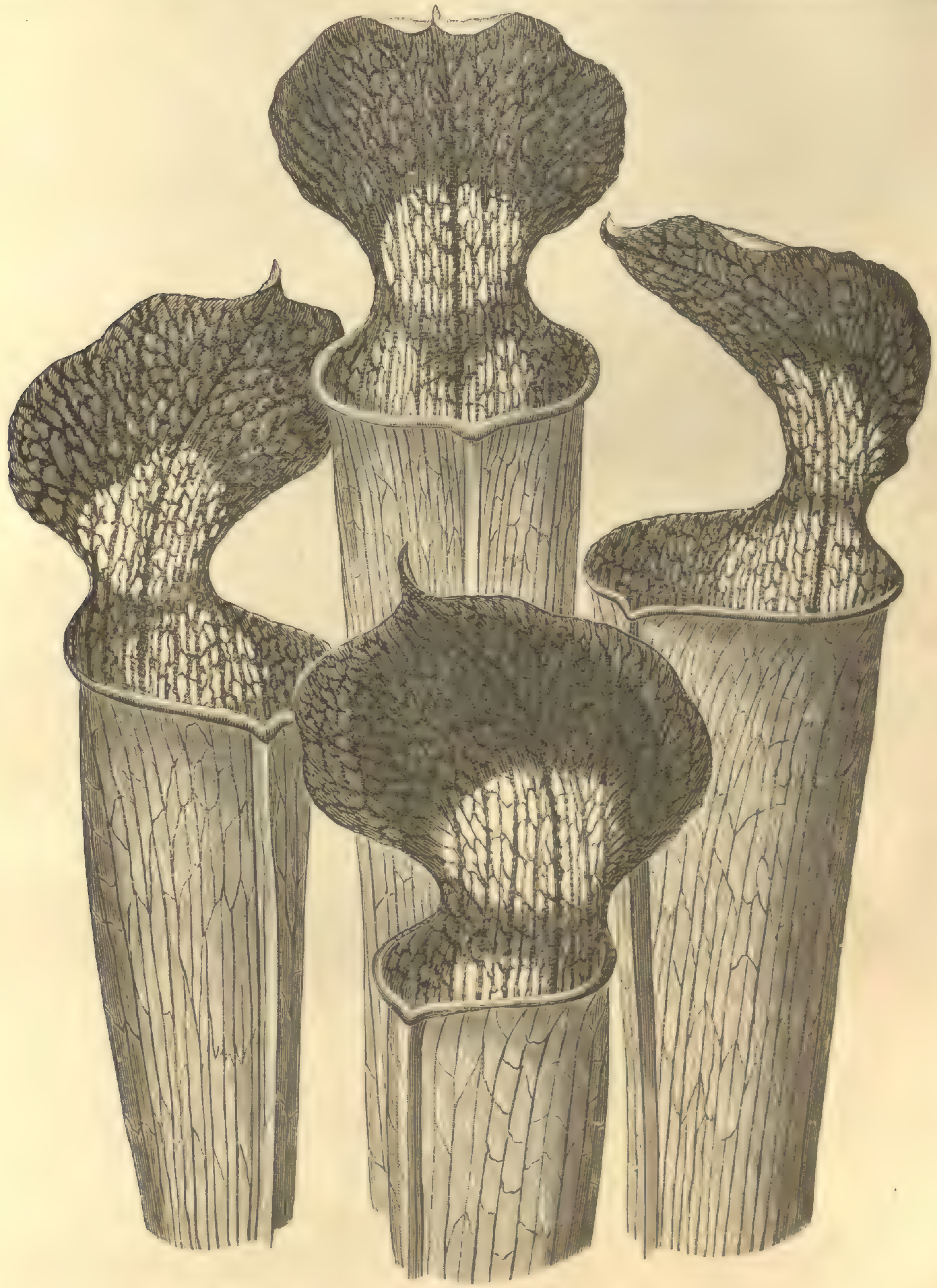

FIG. 417. UPPER PORTION OF PITCHERS OF SARRACENIA FLAVA ATROSANGUINEA.

S. Fildesi (Fildes'), of gardens. Probably synonymous with *S. flava Catesbæi.*

S. flava (yellow).* Trumpet Leaf; Watches. *fl.* yellow, 4in. to 5in. across; petals obovate-spathulate, undulated: stigma 2in. broad; scapes as long as the leaves. April and May. *l.* erect, 2ft. high, yellowish, trumpet-shaped, narrowly winged; lamina

Sarracenia—*continued.*

yellow, erect, orbicular, 3in. to 4in. wide, slender-pointed, tomentose within, reddish at the base, or reticulated with purple veins. 1752. (A. B. R. vi. 381; B. M. 780; F. d. S. x. 1068; I. H. ii. 63; L. B. C. 1957; R. G. 554.)

S. f. atrosanguinea (dark blood-coloured). *fl.* over 3in. across, campanulate; petals creamy-white; sepals primrose-yellow, curling over the sepals. *l.* long, narrow, funnel-shaped; lamina broad, roundish, at first green, with red reticulations, gradually passing to a rich, deep blood-red colour. See Fig. 417, for which we are indebted to Mr. Wm. Bull. (G. C. n. s., xvi. p. 13; I. H. xxvii. 386.)

S. f. Catesbæi (Catesby's). A form with very large pitchers, and a flat, roundish-cordate wing, traversed by red veins. "It is very doubtful, on the score of priority, whether this should not be taken as the type of the species" (Dr. Masters). SYNS. *S. Catesbæi, S. Fildesi* (?) (of gardens), and *S. flava picta.*

S. f. limbata (bordered). A large and remarkable form; the roundish lid marked all around the edge, on the lower side, with a band of brownish-crimson, ¼in. deep.

S. f. maxima (large). A very distinct, large, and handsome kind, having immense pitchers with broad lids, of a pale green colour.

S. f. ornata (adorned). *fl.* 6in. to 8in. in diameter; sepals greenish-yellow; petals of a rich canary-yellow, usually pendulous, in form resembling the falls of an Iris. *l.* recurved at the orifice; upper part strongly marked with well-defined reticulations of dark purplish-red, which are continued over the lamina. 1881. (G. C. n. s., xv. 114, 115, under name of *S. ornata.*)

S. f. picta (painted). A synonym of *S. f. Catesbæi.*

S. psittacina (parrot-beaked).* *fl.* purple, on scapes 1ft. high. April and May. *l.* 2in. to 4in. long, spreading; tube slender, broadly winged, marked with white spots, and reticulated with purple veins; lamina globose, inflated, incurved-beaked, almost closing the orifice of the tube. 1866. (F. d. S. 2063; G. C n. s., xv. p. 816.)

FIG. 418. SARRACENIA PURPUREA.

S. purpurea (purple).* Huntsman's Cup. *fl.* purple; petals inflected over the stigma; scapes 1ft. high. April and May. *l.* 4in. to 6in. long, spreading; tube inflated, contracted at the throat, broadly winged; lamina reniform, erect, hairy within, often purple-veined. 1640. See Fig. 418. (B. M. 849; F. d. S. x. 1076; G. C. n. s., xv. p. 821; L. & P. F. G. ii. p. 25; P. M. B. iii. 221.)

S. rubra (red).* *fl.* reddish-purple, smaller than in *S. purpurea*; petals obovate; scapes exceeding the leaves. May. *l.* 10in. to 18in. high, erect, slender, narrowly winged, paler above, and reticulated with purple veins; lamina ovate, erect, beak-pointed, tomentose within. 1786. (L. B. C. 1163.)

S. r. acuminata (taper-pointed). *l.* erect, pale green, becoming freely reticulated with crimson veins near the top; lamina ovate, acuminate, much larger than the mouth, longitudinally meshed with crimson veins. (B. M. 3515, and H. E. F. 13, under name of *S. rubra.*)

S. undulata (wavy). A synonym of *S. Drummondii.*

S. variolaris (variolar). *fl.* yellow, 2in. wide; petals inflected over the stigma; scapes shorter than the leaves. May. *l.* erect, 6in. to 12in. high, trumpet-shaped, broadly winged, spotted with white near the yellowish summit; lamina ovate, concave, arching over the orifice of the tube, hairy and reticulated with purple veins within. 1803. (B. M. 1710; L. B. C. 803; S. B. F. G. ser. ii. 138, under name of *S. minor*; S. E. B. 53, under name of *S. aduncа.*)

HYBRIDS. By crossing the above species, many beautiful hybrids have been raised, of which the following may be taken as a representative selection:

S. Atkinsoniana (Atkinson's). *l.* long, narrow, and erect, green, with slight, red ribs and reticulations; lamina broad, cordate, green, marked with red ribs and veins. A distinct form, raised between *S. flava maxima* and *S. purpurea*, and partaking most of the characters of the former parent.

S. chelsoni (Chelsea).* *l.* richly coloured with crimson of a brighter hue than those of either parent. A beautiful hybrid between *S. rubra* and *S. purpurea*; the pitchers have the elongated form of *S. rubra* with the broader dilatation of *S. purpurea*, and take a position intermediate between the decumbent habit of the latter and the erect growth of the former. (G. C. n. s., xiii. p. 725, and xv. p. 817.)

S. Courtii (Court's).* *l.*, when young, bright crimson-purple from the middle upwards, reticulated with darker veins, changing with age to deep blood-red, with blackish-purple veins. 1885. A beautiful hybrid between *S. purpurea* and *S. psittacina.* (R. G. 1886, p. 29.)

S. crispata (curled). *fl.* fully 3in. across; petals white, drooping, recurved at the edges, *l.* erect, funnel-shaped; lamina erectly arched and roundish, and, as well as the upper part of the tube, marked by longitudinal pencillings of red, forming a rather open reticulation. Possibly a natural or wild hybrid between *S. flava* and *S. rubra.* (I. H. xxvii. 387; G. C. n. s., xv. p. 633, and xvi. p. 9, under name of *S. flava crispata.*)

S. excellens (excellent). *l.* green, becoming stained with close reticulations of purplish-red near the upper end, the pallid spots reddish externally; lid roundish, arching, and, with the upper part of the tube, suffused and mottled with dark red. Habit erect. Parents: *S. variolaris* and *S. Drummondii alba.*

S. exculta (adorned). *l.* erect, with a narrowish wing, pale green below, the upper end, as well as the roundish, incurved, undulated lamina, strongly blotched with white and reticulated with crimson veins. Intermediate in character between *S. flava atrosanguinea* and *S. Drummondii.*

S. exornata (ornamented). *l.* similar to those of *S. purpurea*, but more erect, slightly narrowed at the mouth, which is dark purple-red, revolute and glossy, the tube dark green, covered with purplish-red veins, the longitudinal ribs stout, with smaller and finer veins between; lamina erect, ovate, wavy, the dark purple-red ribs running up through it and diverging. The marking throughout is very bold and effective. Parents: *S. purpurea* and *S. crispata.*

S. formosa (beautiful).* A hybrid between *S. psittacina* and *S. variolaris.* "The pitchers have more of the decumbent habit of *S. psittacina* than of the erect growth of *S. variolaris*, and are about intermediate in length between those of the two parents. The broad, lateral wing is also intermediate in form, while the beak-like lid of the pitcher is altogether that of *S. psittacina.* All the upper portion of the pitcher has a bright crimson, reticulated nervation, with the characteristic white spotting of *S. variolaris*; the basal portion is pale fulvous-green" (Veitch). See Fig. 419, for which we are indebted to Messrs. Veitch and Sons.

S. illustrata (illustrated). *l.* long, funnel-shaped, strongly marked with longitudinal, crimson ribs, united by veins of a similar colour; lamina cordate, apiculate, green, marked by strong, red, curved veins, the outer of which extend to the margin. This resembles *S. flava* in habit. Parents: *S. flava picta* and *S. Stevensii.*

S. Maddisoniana (Maddison's). *l.* rather erect, short, broad, green, with dull veins outside; mouth translucent-spotted; lamina large, incurved over the tube, ovate, wavy, strongly ribbed with deep purple-red veins. Habit dwarf. Parents: *S. variolaris* and *S. psittacina.*

Sarracenia—*continued.*

S. melanorhoda (dark red). *l.* semi-decumbent, elongated, funnel-shaped, gradually increasing in diameter from the base to the aperture, when mature blood-red, veined with blackish-crimson; wing broad; lamina erect, crisped, reddish-yellow, veined with blackish-crimson, hairy on the side facing the aperture. Parents: *S. Stevensii* and *S. purpurea.* See Fig. 419.

Sarracenia—*continued.*

mondii rubra and *S. purpurea.* See Fig. 420, for which we are indebted to Mr. Wm. Bull.

S. Moorei (Moore's). *fl.* about 4in. in diameter, pendulous, fragrant; sepals greenish, tinted with rose outside; petals deep rosy-pink outside, pale creamy-pink within, 2¼in. long. *l.* about 2ft. high, erect, trumpet-shaped, winged, 4in. in diameter at the

FIG. 419. PITCHERS OF (1) SARRACENIA MELANORHODA AND (2) S. FORMOSA.

S. Mitchelliana (Mitchell's).* *l.* curved, funnel-shaped, broadest at the top, olive-green, traversed by a profuse network of fine red veins, the whole changing, later on, to reddish-crimson; lamina cordate-reniform, undulated, with a bold reticulation of deep crimson-red. A very elegant plant. Parents: *S. Drummondii* and *S. flava.* (G. C. n. s., xvi. p. 44.)

S. Popei (Pope's). *fl.* 4in. in diameter; sepals greenish, flushed with red, ovate-oblong; petals twice as long as the sepals, mouth, green; lamina about 3in. across, sessile, hairy, with a network of crimson veins inclosing lighter spaces. Parents:

Sarracenia—*continued.*

oblong-obovate, white at base, the rest velvety-crimson, margined with pale yellow, creamy-pink within. *l.* erect, about 2ft. high, slender, trumpet-shaped; lamina 3½in. across, ovate, acuminate. Parents: *S. flava* and *S. rubra*. (G. C. n. s., xvi. p. 41.)

Sarracenia—*continued.*

S. Swaniana (Swan's). *l.* funnel-shaped, slightly incurved, greenish-purple, the inside of the tube, as well as the lamina, being closely reticulated with crimson veins; wing rather broad; lamina cordate-ovate, bilobed at the apex. A handsome and

FIG. 420. PITCHERS OF (1) SARRACENIA SWANIANA AND (2) S. MITCHELLIANA.

S. Stevensii (Stevens'). *l.* large and erect, with prominent, straight, deep crimson veins, the interstices traversed with numerous veinlets of the same colour; lamina large, crisped, deep crimson. Parents: *S. purpurea* and *S. flava*, the latter being the seed-bearer. (G. C. n. s., xvi. p. 40.)

well-marked hybrid between *S. variolaris* and *S. purpurea*. See Fig. 420.

S. Tolliana (Toll's). *l.* long, slender, funnel-shaped, the orifice appearing as if cut straight across, with a recurved margin, either wholly deep purple-red with darker ribs and veins, or

Sarracenia—*continued.*

greenish with dark purple ribs and veins; lamina broadly reniform, undulated, reticulated with reddish-purple. Parents: *S. Drummondii alba* and *S. flava.*

S. Williamsi (Williams'). * *l.* quite erect, rather short, funnel-shaped, constricted a short distance below the apex, green, ribbed with deep purplish-crimson; wing veined with purplish-crimson; lamina very broad and full, cordate-reniform, strongly marked by trichotomous ribs, united by smaller veins, the inside more closely reticulated with deep purplish-crimson. A very distinct and striking hybrid between *S. purpurea* and *S. flava.*

SARRACENIACEÆ. A very small natural order of curious, perennial herbs, inhabiting turfy, spongy bogs in America. Flowers solitary or few, large, racemose, nodding; sepals four or five, free, hypogynous, closely imbricated from the base, sub-petaloid, persistent; petals five, free, hypogynous, imbricated, deciduous, or (in *Heliamphora*) wanting; stamens numerous, hypogynous, free; filaments filiform; anthers two-celled; scapes naked or few-bracted. Leaves all radical, with a tubular or amphora-shaped petiole (pitcher); blade (lid) small, rounded, usually lying on the orifice of the petiole. "*Sarracenia rubra* has been vaunted in Canada as a specific against small-pox, but has not proved such. The pitcher-shaped leaves are effective insect traps; a sugary secretion exudes at the mouth of the pitcher, and attracts the insects, which descend lower in the tube, where they meet with a belt of reflexed hairs, which facilitate their descent into a watery fluid that fills the bottom of the cavity, and at the same time prevents their egress" (Le Maoût and Decaisne). The order embraces three genera—*Darlingtonia*, *Heliamphora*, and *Sarracenia*—and eight species.

SARSAPARILLA. A name applied to the roots of several plants, more especially those of certain species of *Smilax.*

SASHES. Any framework in a glass structure, in which glass is embedded, whether fixed to the rafters or not, might be called a Sash, but the term is most generally used in reference to glazed frames which open for purposes of ventilation in a house, or are used on pits, &c., where they may be kept on or pulled off, as considered requisite. These latter are called movable Sashes. In houses of modern construction, most ventilating Sashes are made to open by means of iron gearing and levers, an arrangement which is much to be commended for its easy and effectual mode of working.

SASSAFRAS (from *Sassafras*, the Spanish word for Saxifrage, like virtues to which plant it was supposed to possess). ORD. *Laurineæ.* A monotypic genus. The species is an ornamental, hardy, deciduous tree, with spicy-aromatic bark, and very mucilaginous twigs and foliage. In Virginia, a kind of beer is manufactured from the young shoots; other parts of the tree are of economical value, the oil extracted from the fruits being used by perfumers. The tree is frequently grown in this country: it is remarkable for the variety it exhibits in the shape and size of its leaves. For culture, &c., *see* **Laurus.**

S. officinale (officinal). Sassafras-tree. *fl.* greenish-yellow, shortly and loosely racemose; perianth tube very short, the limb segments six (sometimes variously abnormal); bracts small, narrow; racemes nearly umbelliform, shortly pedunculate. April. *l.* alternate, membranous, penniveined, ovate, entire, or some of them three-lobed, soon glabrous. *h.* 15ft. to 30ft. Eastern United States, 1633. (B. M. Pl. 220; T. S. M. 360.) SYN. *Laurus Sassafras.*

SASSAFRAS, CALIFORNIAN. *See* **Umbellularia californica.**

SASSAFRAS, SWAMP. A common name for *Magnolia glauca.*

SASSAFRAS, TASMANIAN. A name applied to *Atherosperma moschata.*

SASSAFRAS-TREE. *See* **Sassafras officinale.**

SATIN FLOWER. *See* **Sisyrinchium.**

SATIN MOTH. *See* **Liparis.**

SATINWOOD-TREE. *See* **Chloroxylon Swietenia.**

SATIVUS. Cultivated.

SATUREIA (the old Latin name used by Pliny). ORD. *Labiatæ.* A genus comprising about fourteen species of highly aromatic, hardy herbs or under-shrubs; one is a native of Florida, and the rest inhabit the Mediterranean region. Flowers whorled; calyx five-toothed or very obscurely bilabiate; corolla tube equalling the calyx or bracteoles, the limb bilabiate; stamens four, distant. Leaves small, entire, often fascicled; floral and cauline ones conformed, or the uppermost ones reduced to small bracts. Several species have been introduced, but only two call for notice here. The leaves of both are employed, like other sweet herbs, for seasoning, in cookery. "Both species were noticed by Virgil as being among the most fragrant of herbs, and on this account were recommended to be grown near bee-hives. Vinegar, flavoured with Savory and other aromatic herbs, was as much used by the ancient Romans as Mint-sauce is at the present day with us" (Lindley and Moore).

S. hortensis (garden). Summer Savory. *fl.* pale lilac, small, axillary, on short pedicels; common peduncle sometimes three-flowered. July. *l.* oblong-linear, acute, shortly narrowed at base into the petioles. *h.* 6in. or rather more. South Europe, 1562. A pubescent annual. *See also* **Savory, Summer.**

S. montana (mountain). Winter Savory. *fl.* very pale purple; cymes shortly pedunculate, approximating in a spike or raceme. June. *l.* oblong, linear, and acute, or the lower ones spathulate or cuneate and obtuse. Stems woody at base, diffuse, much branched. South Europe, 1562. A glabrous or scabrous-pubescent under-shrub. (S. F. G. 543.) *See also* **Savory, Winter.**

SATYRIUM (*Satyrion* was the name given by Dioscorides to one of the Orchids, from *saturos*, a satyr; alluding to supposed aphrodisiacal properties). SYN. *Diplecthrum.* ORD. *Orchideæ.* A rather large genus (nearly fifty species have been described) of stove, greenhouse, or half-hardy, terrestrial, tuberous-rooted orchids, inhabiting the East Indies, the Mascarene Islands, and, for the most part, Southern and tropical Africa. Flowers mediocre or rather large, rarely small, in dense spikes; sepals and petals free, much spreading or reflexed; lip sessile at the base of the column, broad, concave, galeate, or cucullate, undivided, double-spurred, or bisaccate; bracts membranous or somewhat leafy. Leaves few on the lower part of the stem, rarely many at the sides of a tall stem. Tuber undivided. The species in cultivation are described below. Most of them will succeed admirably in a cold frame, in a compost of turfy peat, fibry loam, and sand, with plenty of drainage. *S. ciliatum* and *S. nepalense* thrive under similar treatment as regards compost, but require a greenhouse temperature. Propagation may be effected by division of the roots, made as fresh growth is commencing. Except where otherwise indicated, the under-mentioned species are South African.

S. aureum (golden). * *fl.* deep orange-colour, shaded with rich crimson. July and August, and continuing in perfection a long time. *h.* 1ft. or more. 1842. A fine plant. (P. M. B. xv. 31.)

S. candidum (white). *fl.* white, very sweetly aromatic; sepals linear, spreading; petals smaller, ascending, recurved at apex; lip inflated, obtuse. September. *l.* twin, somewhat roundish-ovate, glabrous. *h.* sometimes 1½ft. 1836.

S. carneum (flesh-coloured). *fl.* white, suffused with flesh-colour, large; sepals obtuse; petals inequilateral; lip galeate, apiculate, reflexed; bracts rose-margined. June. *l.* radical, twin, orbicular, fleshy; sheaths leafy, cucullate. *h.* 1½ft. 1797. (B. M. 1512; F. d. S. 329.)

S. ciliatum (ciliated). *fl.* pinkish-white; sepals linear, narrower than the petals, ciliated; lip galeate, the spurs very short; bracts very long, leafy; spike oval, imbricated. August. *l.* ovate-lanceolate, erect. Himalayas, 1880.

S. corlifolium (leathery-leaved). * *fl.* yellow; sepals and petals linear, obtuse, glabrous, shorter than the orbicular lip; spur cylindrical, obtuse, bearded within; bracts ovate, reflexed; spike few-flowered. October. *l.* oblong-lanceolate, acute, spreading, slightly scabrous on the margins. *h.* 1ft. 1820. (B. M. 2172; B. R. 703; S. B. F. G. ii. 3; L. B. C. 104, under name of *S. cucullatum.*)

Satyrium—*continued.*

S. cucullatum (hooded). *fl.* green, with an unpleasant odour; intermediate sepal longer than the petals, linear, obtuse, lateral ones larger, all connate at base; lip acute, fleshy; spurs pendulous; bracts concave, reflexed. June. *l.* twin, orbicular, scabrous-ciliated; sheaths inflated, distant, furfuraceous-ciliated. *h.* 9in. 1786. (B. R. 416.) SYN. *Orchis bicornis* (A. B. R. 315).

S. erectum (erect). *fl.* of a yellowish-orange or pale purple colour; sepals and petals scarcely longer than the galeate lip; spurs filiform; bracts concave, reflexed, longer than the flowers; spike many-flowered. February. *l.* oblong, obtuse, coriaceous, with cartilaginous margins, scabrous, much-spreading, changing to convolute, imbricated sheaths. Stem 1½ft. to 2ft. high, wholly sheathed. 1838. (B. 117.) SYN. *S. pustulatum* (B. R. 1840, 18).

S. foliosum (leafy). *fl.* pale purplish, small, erect; lateral sepals spreading, the middle one decurved; petals obtuse, sub-erect; galea hemispherical, longer than the filiform spurs; bracts longer than the flowers; spike dense, obtuse, imbricated. July. *l.* oblong-lanceolate, erect, cucullate, imbricated, nearly as long as the stem. Stem 1ft. to 1½ft. high, leafy. 1828.

S. nepalense (Nepaul).* *fl.* rose-pink, fragrant; lateral sepals oblong, middle one and petals linear; lip galeate, apiculate; spurs filiform; bracts reflexed, as long as the flowers; spike oblong, loose, many-flowered. *l.*, radical ones ovate or lanceolate, erect; cauline ones shorter, spreading, sheathing at base. *h.* 1ft. or more. East Indies, 1882. (B. M. 6625.)

S. pustulatum (pustular). A synonym of *S. erectum*.

SAUCERS. Occasionally, these are useful for standing plants in, while they are in rooms or in places where water cannot readily be applied. Generally, plants are soon injured by standing in Saucers of water, as the soil becomes sour; but those which naturally require plenty of moisture, or grow in water, may be so treated with safety. Saucers are made to suit all the smaller sizes of flower-pots, and may be procured, in most instances, from the same pottery. For preserving a tender plant against the attack of slugs, &c., it is sometimes an effectual plan to place an inverted pot in the middle of a Saucer of water, and stand the plant on the top of it. Glazed Saucers may be recommended for rooms, as they do not allow moisture to pass through and injure anything on which they may be stood.

SAUNDERSIA (named after W. W. Saunders, 1809-1879, an ardent collector and cultivator of rare and curious plants). ORD. *Orchideæ*. A monotypic genus. The species is a stove, epiphytal orchid. For culture, *see* **Epidendrum.**

S. mirabilis (wonderful). *fl.* greenish-white, flushed with yellow and purple, medium-sized; sepals and petals free above, sub-equal, spreading, ovate; lip shortly connate with the column towards the base, the claw exceeding the sepals, the blade bilobed; column short; pollen masses two; scape short, recurved, subfasciculately many-flowered; bracts ovate. *l.* oblong, fleshy-coriaceous. Stem very short, one-leaved, scarcely or not at all pseudo-bulbous. Brazil. (R. X. O. 177.)

SAURAUJA (from *Sauraujo*, the name of a Portuguese botanist known to Willdenow). SYNS. *Blumia*, *Marumia*, *Palava* (of Ruiz and Pavon), *Reinwardtia* (of Blume). ORD. *Ternströmiaceæ*. A genus comprising about sixty species of mostly stove trees or shrubs, usually strigose-pilose or hairy, inhabiting Asia or tropical and sub-tropical America. Flowers usually hermaphrodite; sepals five, closely imbricated; petals five, imbricated, connate or rarely nearly free at base; stamens numerous, adhering to the base of the corolla; peduncles axillary or lateral, many-flowered, sub-paniculate, or rarely shortened and few-flowered. Leaves usually serrated. The under-mentioned species merit culture on account of their fine flowers and leaves. All are stove shrubs, thriving in a compost of loam and peat. Propagated by ripened cuttings, inserted in sand, under a glass, in heat.

S. excelsa (tall). *fl.* white; peduncles long, covered with brown hairs, trichotomously panicled at the apex. June. *l.* oblong-obovate, rather acute, quite entire, scabrous above, hairy beneath at the veins. *h.* 10ft. Caraccas, 1820.

S. nepaulensis (Nepaul). *fl.* white; racemes many-flowered, panicled, on long peduncles. August. *l.* lanceolate, 9in. long, 2in. to 3in. wide, acuminate, serrate, smooth above, beneath (as well as the branchlets) covered with brown down. *h.* 6ft. Nepaul, 1824.

Saurauja—*continued.*

S. spectabilis (remarkable). *fl.* white, in ample, much-branched panicles; petals obcordate, twice exceeding the calyx. June. *l.* obovate-lanceolate, shortly acuminate, connate at base, petiolate, doubly serrate, naked in the axils of the veins. Branches, peduncles, calyces, and nerves of leaves, adpressedly ferruginous-bristly. *h.* 10ft. Brazil, 1842. (B. M. 3982.)

SAUROGLOSSUM. Included under **Spiranthes** (which *see*).

SAUROMATUM (from *saura*, a lizard; alluding to the speckled interior of the spathe). ORD. *Aroideæ* (*Araceæ*). A genus consisting of about half-a-dozen species of stove, tuberous-rooted, herbaceous perennials, natives of tropical Asia and Africa. Flowers on a long, appendiculate spadix, shorter than the spathe, males and females remote; spathe marcescent, at length vanishing, the tube ventricose, the margins more or less connate, the throat opening, the lamina lanceolate, elongated. Leaves solitary, pedately parted; petioles elongated, terete. The introduced species are here described. They thrive in a compost of light loam and peat, in equal proportions. Propagated by offsets.

S. guttatum (spotted). *fl.*, spathe tube green outside, oblong, the lamina olive outside and yellowish-green within, with rather large, irregular, dark purple spots; spadix terete-conical; peduncle short. May. *l.*, segments oblong or oblong-lanceolate, acuminate; petioles unspotted. *h.* 1½ft. Himalayas, 1830. (B. R. 1017, under name of *Arum venosum*.)

S. pedatum (pedate-leaved). *fl.*, spathe tube dark purple within, loosely constricted above the middle, the lamina narrow-elongated, yellowish, with very dense, confluent, purple spots. March. *l.* pedatisect; segments seven, nine, or eleven, obovate-oblong, acute, very shortly or scarcely acuminate, obtuse at base; petioles long. *h.* 3ft. East Indies, 1815. (R. G. 495.)

S. punctatum (dotted). *fl.*, spathe green, marked with brown spots; peduncle short. *l.* trifoliolate; middle leaflet solitary, elliptic, long-acuminate; lateral ones pedately seven-parted, the outer segments smaller. *h.* 1ft. Himalaya (?), 1858.

S. venosum (veined).* *fl.*, spathe purplish outside, the tube oblong, the lamina yellowish within, with crowded, small, oblong, purple spots; spadix appendix very long, cylindrical; peduncle very short, violet-spotted. *l.*, segments oblong, cuneate towards the base, acuminate at apex, the midrib and lateral nerves yellowish; petioles spotted. *h.* 1ft. East Indies, 1848. (B. M. 4465; F. d. S. 1334; L. J. F. 12, under name of *S. guttatum*.)

SAUROPUS (from *sauros*, a lizard, and *pous*, a foot; Blume, the originator of the genus, does not say why it is so named). SYN. *Ceratogynum*. ORD. *Euphorbiaceæ*. A genus comprising about fourteen species of stove shrubs, with the habit of *Phyllanthus*, natives of the East Indies, the Malayan Archipelago (and New Caledonia ?). Flowers fascicled in the axils, all pedicellate, the males minute, the females in the same or in a distinct axil, solitary or rarely two. Leaves alternate, distichous, membranous, entire. For culture of *S. albicans Gardnerianus*, the only species introduced, *see* **Phyllanthus.**

S. albicans Gardnerianus (whitish, Gardner's) *l.* oblong-ovate, scarcely rounded-obtuse or sub-obtuse at base, acute and acuminate at apex, small, deep green, with a greyish central blotch. Branches and branchlets slender, green, the latter angular. Ceylon, 1861.

SAURUREÆ. A tribe of *Piperaceæ*.

SAURURUS (from *sauros*, a lizard, and *oura*, a tail; alluding to the form of the inflorescence). Lizard's Tail. SYNS. *Anonymo*, *Mattuschkia*, *Spathium*. TRIBE *Saurureæ* of ORD. *Piperaceæ*. A small genus (two species) of hardy, aquatic, perennial herbs; one is a native of Eastern Asia, and the other North American. Flowers small, numerous, in a terminal raceme, each with a small bract; perianth wanting; stamens six or eight, or fewer by abortion. Fruit sub-globose. Leaves alternate, broad, cordate; stipules membranous, adnate to the petioles. The plants should be grown in sandy loam, in a pond or cistern. They may be increased by seeds, or by divisions.

S. cernuus (drooping). American Swamp Lily. *fl.* white, in a dense spike, 4in. to 6in. long, nodding at the end; bracts

Saururus—*continued.*

lanceolate; filaments long and capillary. June to August. *l.* cordate, acuminate, converging-ribbed, without distinct stipules. Stem 1ft. to 2ft. high. North America, 1759.

S. chinensis (Chinese). A synonym of *S. Loureiri.*

S. Loureiri (Loureiro's). This is closely allied to *S. cernuus*, but may be distinguished by the following characters: filaments very short; spike equalling the leaves; stem very angular. Eastern Asia, 1819. (R. G. 756.) SYN. *S. chinensis.*

FIG. 421. FLOWERING BRANCH OF SAUVAGESIA ERECTA.

SAUSSUREA (named after the Swiss philosopher Horace Benedict de Saussure, 1740-1799, who possessed a considerable knowledge of botany). Sawwort. SYNS. *Bennetia*, *Heterotrichum* (of Bieberstein). Including *Aplotaxis* and *Frolovia*. ORD. *Compositæ*. A genus comprising about sixty species of hardy, glabrous or white-tomentose, perennial herbs, mostly found on mountains in Europe, Asia, and North America. Flower-heads purplish or bluish, sometimes narrow and corymbose, sometimes broader and pedunculate, solitary or loosely paniculate; involucre ovoid, oblong or globose, with many series of closely imbricated bracts, the outer ones elongated; receptacle flat or convex, densely bristly-paleaceous or rarely naked; rays sometimes deeply five-fid; achenes glabrous; pappus bristles in one or two series. Leaves alternate, entire, toothed, or pinnatifid, the teeth or lobes unarmed. The species are not very ornamental. A selection of those introduced is given below. They thrive in ordinary garden soil, and may be increased by seeds.

S. albescens (whitish). *fl.-heads* purple; involucre oblong, slightly hoary, the scales very acuminate; corymbs compound, many-headed. July. *l.* white-tomentose beneath; cauline ones sessile, oval, obtuse, sub-entire. *h.* 2ft. Nepaul, 1837. SYN. *Aplotaxis albescens.*

S. alpina (alpine). *fl.-heads* purple, 2in. to 3in. in diameter; involucre ovoid, with obtuse, woolly bracts; corymbs dense. August. *l.* oblong-lanceolate, toothed, cottony beneath; lower ones petioled, 4in. to 7in. long, acuminate; upper ones smaller, sessile. Stem simple, 6in. to 8in. high, stout, erect, leafy. Europe (Britain), &c. (Sy. En. B. 703.)

S. elegans (elegant). *fl.-heads* pink, corymbose; involucre subcylindrical, hoary-villous, the outer scales ovate, the inner ones oblong. July. *l.* slightly scabrous above, cobwebby-tomentose beneath; lower ones lyrately pinnatifid or toothed; upper ones oblong, nearly entire, acuminate at both ends. *h.* 2ft. Caucasus, 1820.

S. pulchella (pretty).* *fl.-heads* purple, globose, corymbose; outer involucral scales tomentose, inner ones coloured. July. *l.* slightly scabrous, pinnatifid; segments linear-acute, slightly toothed; cauline leaves sub-decurrent, the uppermost ones undivided. *h.* 2ft. Siberia, &c., 1835. (B. R. xxviii. 18; B. M. 2589, under name of *Serratula pulchella.*)

Saussurea—*continued.*

S. pygmæa (dwarf). *fl.-heads* purple; involucral scales slightly hairy, all acuminated. July. *l.* mostly clustered, sessile, linear, sub-entire, with revolute margins, slightly hairy beneath. Stems dwarf, sparsely leafy, one-headed. *h.* 1ft. Eastern Europe, 1816. (J. F. A. 440, under name of *Serratula pygmæa.*)

SAUSSUREA (of Salisbury). A synonym of *Funkia.*

SAUSSURIA (of Mœnch). A synonym of **Nepeta** (which *see*).

SAUVAGESIA (named after Francis Bossier de Sauvages, 1706-1767, Professor of Botany at Montpelier, and a friend and correspondent of Linnæus). ORD. *Violarieæ.* A genus containing about ten species of stove, highly glabrous herbs or sub-shrubs, all tropical American. Flowers white, pink, or violet, axillary or disposed in terminal racemes; sepals sub-equal; petals equal, convolute. Leaves alternate, rather rigid, entire or serrulated; stipules pectinate-ciliated. The species introduced is a charming little annual. Seeds should be thinly sown, during March, in pots of loam and peat, and the young plants treated as other stove annuals.

S. erecta (erect). Iron Shrub; St. Martin's Herb. *fl.* pink or purple-red; sepals aristate-acuminate; petals obovate, apiculate. May to October. *l.* lanceolate, serrated. Stem branched, procumbent or erect. *h.* 6in. Mexico, 1824. See Fig. 421. SYN. *S. geminiflora.*

S. geminiflora (twin-flowered). A synonym of *S. erecta.*

SAUVAGESIEÆ. A tribe of *Violarieæ.*

SAVANNAH FLOWER. A name applied to *Echites suberecta*, and other species.

SAVASTANA. A synonym of **Hierochloe** (which *see*).

SAVIN-TREE. *See* **Juniperus Sabina.**

SAVORY, SUMMER (*Satureia hortensis*). A hardy annual, native of Southern Europe, cultivated for its aromatic tops, which are used, in culinary preparations, for flavouring and seasoning. It is raised from seeds, which should be sown early in April, in shallow drills, about 1ft. apart. Select a sunny situation, and thin out the seedlings, when large enough, to 6in. asunder in the rows. When the plants are in flower, they may be pulled up, tied in bundles, and dried for winter use.

SAVORY, WINTER (*Satureia montana*). A dwarf, hardy, evergreen under-shrub, also a native of Southern Europe, and grown for the same purposes as Summer Savory. It may be raised from seeds, sown at a similar period, and in the same way; also from cuttings and divisions. Cuttings formed of young side shoots, with a heel attached, may be readily rooted under a hand glass, or in a shady border outside. Divisions should be made in March or April, and plants obtained in this way, or from cuttings, should be permanently inserted in rows, at distances of about 1ft. apart, during a showery period, at the latter part of summer.

SAVOURY AKEE-TREE. *See* **Cupania sapida.**

SAVOY CABBAGE. *See* **Brassica oleracea bullata major** and **Cabbage.**

SAWDUST. This is occasionally used as a manure; but it decays so slowly that it is little esteemed for this purpose. Applied in considerable quantity, it has been found to produce little effect the first year; but each succeeding year the crop was increased, till it reached its maximum in the fourth year. Sawdust should be made up into a compost with farmyard manure, earth, and other materials; and the value of the compost is much increased by saturation with liquid manures, gas-liquor, or other fluids containing ammonia. The manurial value of Sawdust is considerably greater when it is well decayed than while it is fresh; but the material can be recommended as manure only when there are accumulations of it to be disposed of.

SAWFLIES (*Tenthredinidæ*). A large section of *Hymenoptera* (*see* **Insects**), characterised by the females possessing an organ adapted to cut through the skin of

FIG. 422. LARVÆ OF ROSE-LEAF SAWFLY.

leaves and of branches, so as to permit of eggs being placed in the slits. This organ resembles a minute double saw (whence the popular name of the insects), and is toothed so as to serve as one, but the details of the toothing vary with the species. The larvæ of all feed on plants. Most of them greatly resemble the larvæ of Butterflies and Moths, except in having from eighteen to twenty-two claspers or prolegs. Nearly all the larvæ feed on leaves, exposed on the surfaces or the edges of the latter; but some burrow between the surfaces of the leaves (*e.g.*, *Fenusa Ulmi*), and others live protected in the interior of fleshy pea-shaped or bean-shaped galls on the leaves (*e.g.*, *Nematus gallicola*), or swellings in the branches, of Willows. When full grown, most of them go underground, spin cocoons there, and in them become pupæ. Some (*e.g.*, *Trichiosoma lucorum* and *Lyda*) fix their cocoons to branches of the food-plants, or spin up among dead leaves or rubbish. The larvæ of the Rose-leaf Sawfly (see Fig. 422), and of the Gooseberry and Currant Sawfly (see Fig. 423), are good types of Sawfly larvæ.

FIG. 423. LARVA OF GOOSEBERRY AND CURRANT SAWFLY (*Nematus Ribesii*).

In like manner, the Gooseberry and Currant Sawfly (*Nematus Ribesii*, see Fig. 424) is a good type of a large majority of the mature Sawflies.

Sawflies are mostly sluggish and heavy in their movements, even on the wing. The head is usually broad; and there is no narrowed foot-stalk between the thorax and the abdomen. The colours are very generally black, yellow, or brown on the body and limbs; the wings are almost always transparent, and are of the form shown in Fig. 424. The largest Sawflies in Britain are about as large as a small Humble Bee, but most are of small size.

Many species are very harmful to cultivated plants; and references will be found to the worst under **Gooseberry and Currant Sawfly, Lophyrus, Lyda, Nematus, Pear** (INSECTS), **Rose Sawflies, Slugworms,** and **Turnip Sawfly.** Among the plants that suffer most are

Sawflies—*continued.*

Coniferæ, Currants and Gooseberries, Hawthorns, Roses, fruit-trees, Willows, and Turnips; but few plants altogether escape injury. Certain species of Sawflies, injurious to cultivated produce, feed exposed on the plants, and may be hand-picked; or, if very numerous, and if circumstances permit, they may be destroyed by watering the plants with infusions of powder of Hellebore, or of Paris Green. Social larvæ, as in the genus *Lyda*, which spin a common web, may be removed and destroyed with the web. For further information, *see* the headings just quoted.

SAW PALMETTO. *See* **Serenoa serrulata.**

SAWS. Instruments in frequent demand for various purposes in gardens. An ordinary Saw, with the teeth set rather wide, answers well for sawing wood, cutting down trees, &c. In addition, a cross-cut Saw should be at command, as it is occasionally necessary to cut down branches or trees that are too large for severing without an instrument of this description. Pruning Saws, for removing branches or spurs in ordinary pruning, are invaluable for their purpose; they are small, and carried to a point, something like those used for turning or cutting circular holes in boards. It is most important that Saws of every kind should be kept clean and in a dry place, when not in use. It is a good plan to rub a little sweet oil over the blades, in order to prevent them from rusting.

FIG. 424. GOOSEBERRY AND CURRANT SAWFLY (*Nematus Ribesii*) *a*, Lines to show actual spread of wings and length of body.

SAW-WORT. A common name for certain species of *Saussurea* and *Serratula*.

SAXEGOTHEA (named in honour of his late Royal Highness Prince Albert). ORD. *Coniferæ*. A monotypic genus. The species is a half-hardy, evergreen tree. For culture, *see* **Taxus.**

S. conspicua (conspicuous). Prince Albert's Yew. *fl.*, male catkins in terminal spikes or racemes; females in spherical heads, in the form of a little cone, on long, slender, terminal foot-stalks, sometimes drooping. June. *fr.* composed of several consolidated, free scales, formed into a solid, fleshy, depressed cone. *l.* alternate and scattered, or somewhat in two rows on the branchlets, leathery, stiff, linear or oblong-lanceolate, somewhat falcate, slightly twisted and reflected, ½in. to 1½in. long, convex above, shortly petiolate, acute. *h.* 30ft. Southern Chili, 1846. (J. H. S. vi. 258.)

SAXIFRAGA (an old Latin name used by Pliny, and derived from *saxum*, a rock, and *frango*, to break; so called because it was supposed to break stones in the

Saxifraga—*continued.*

bladder). Breakstone; Rockfoil; Saxifrage. Including *Ciliaria*, *Hirculus*, *Megasea*, *Miscopetalum*, *Muscaria*, *Robertsonia*, and *Spatularia*. ORD. *Saxifrageæ*. An extensive genus of mostly hardy, perennial, rarely annual, highly glabrous, pilose, or glandular, erect or decumbent herbs, natives of the North and South temperate and Arctic zones, rarely found in Asia, and very rare in South America; absent from Australia, South Africa, and the Pacific. Flowers white or yellow, rarely purple or rose, paniculate or corymbose; calyx tube short or elongated, free or adnate at the base with the ovary; lobes five, erect or spreading, imbricated; petals five, equal or rarely unequal, sometimes fimbriated or gland-bearing at base, perigynous or sub-hypogynous; stamens ten, rarely five, inserted with the petals. Leaves variable; radical ones frequently rosulate; cauline ones generally alternate; petioles sheathing at base. A dozen species are indigenous to Britain. The best-known species are described below; all, except where otherwise stated, are hardy perennials. With few exceptions, Saxifragas are amongst the easiest of plants to cultivate, they may be grown in any open soil, and generally prefer to be surrounded with stones. Propagated readily by offsets or by division of the tufts. Great variation is represented in the habits of the numerous species. They are nearly all beautiful and interesting subjects.

FIG. 425. SAXIFRAGA CÆSIA, showing Habit and detached Rosette of Leaves.

S. adscendens (ascending). *fl.* white; calyx and peduncles hispid; petals obovate, retuse. April. *l.* fleshy, three-lobed; radical ones cordate, on rather long petioles, with the lobes incised; cauline ones somewhat cuneiform, the uppermost entire. *h.* 3in. North America, &c., 1732. Annual. SYN. *S. petræa* (B. M. 3026).

S. adscendens (ascending), of Vahl. A synonym of *S. aquatica*.

S. aizoides (Aizoon-like).* *fl.* orange or golden-yellow, dotted with red, ½in. in diameter; petals distant. June and July. *l.* linear-oblong, crowded below, scattered on the flowering stems, ½in. to 2in. long, spreading; lower ones reflexed, often ciliated. Stems decumbent, tufted, much-branched; branches 3in. to 8in. long. Alpine and Arctic Europe (Britain). (Sy. En. B. 551.)

S. Aizoon (Aizoon). *fl.*, petals cream-colour, often spotted at the base, obovate; scape many-flowered, erect, clammy-pubescent. June. *l.* clustered at the root, persistent, thick, spathulate, with white, cartilaginous, toothed margins. *h.* 5in. to 10in. Europe, North America, 1731. *minor* is a smaller form. SYN. *S. intacta*.

S. Andrewsii (Andrews'). *fl.*, petals white, dotted with purple above the middle, oblong. Summer. *l.* rather thick, sparsely hairy; basal ones spathulate, nearly lingulate, flat, cuneate-

Saxifraga—*continued.*

attenuated, very obtuse, minutely crenate-serrated; cauline ones oblong, serrated. Stems erect, glandular-hairy, few-leaved; branches racemose. *h.* 6in. 1848. A hybrid between *S. Geum* and *S. Aizoon*.

S. aquatica (aquatic). *fl.* white, large, shortly pedicellate; calyx segments ovate-lanceolate, longer than the tube; petals obovate-oblong, more than twice the length of the calyx; inflorescence loose below, crowded above. July and August. *l.* fleshy, sparsely pilose, dilated at base; cauline ones sessile, incised-trilobed above the middle. Stems simple or racemose-paniculate from the base. *h.* 1ft. to 1½ft. Pyrenees. (R. G. 1167.) SYN. *S. adscendens* (of Vahl).

S. aretioides (Aretia-like).* *fl.*, petals golden-yellow, crenulate, with several straight nerves; corymb dense, few-flowered; peduncles clothed with clammy down. May to July. *l.* aggregate, linear-ligulate, upright, mucronulate, keeled, glaucous, with cartilaginous margins. *h.* 2in. Pyrenees, 1826. (B. M. 5849.)

S. bronchialis (bronchial). *fl.* cream-coloured; calyx segments oblong-lanceolate, glabrous; petals oblong, twice as long as the calyx; pedicels glandular, erecto-patent. May. *l.* rather rigid, linear-lanceolate, mucronulate at apex, the margins ciliated or ciliate-spinulose. Stems ascending, densely leafy at base; floriferous ones paniculate above. *h.* 6in. North America, 1819. SYN. *S. densa*.

S. Burseriana (Burser's).* *fl.* milk-coloured, large and beautiful, lined with yellowish nerves; petals roundish, with curled edges. March to June. *l.* rosulate, triquetrous, pungent, smooth, glaucous. Stems usually one-flowered. *h.* 1½in. Alps, 1826. Plant densely tufted. (Gn., Sept. 17, 1877.)

S. B. major (larger).* *fl.* white, solitary, on peduncles about 2in. high. *l.* acute, ciliated, in small, dense rosettes. 1884. A beautiful little rockwork plant. (G. C. n. s., xxi. p. 141.)

S. cæsia (grey).* *fl.* milk-coloured, disposed in a small panicle; petals roundish, unguiculate. May and June. *l.* linear-oblong, aggregate, recurved, keeled, the upper surface with marginal dots regularly disposed; cauline ones few. Stems (and peduncles) smoothish. *h.* 1½in. to 3in. Alps, 1752. See Fig. 425. (J. F. A. 374; L. B. C. 421.)

S. cæspitosa (tufted).* *fl.* white, campanulate, few, small, crowded. July and August. *l.* cuneate, three to five-lobed; lobes sub-parallel, obtuse; upper cauline leaves undivided. *h.* 3in. Europe (Britain). Plant densely tufted, with short, flowerless shoots. (Sy. En. B. 556.)

FIG. 426. SAXIFRAGA CAMPOSII.

S. Camposii (Don Pedro del Campo's).* *fl.* white, ½in. in diameter, corymbose, inclined; petals spathulate, twice as long as the stamens. May. *l.* very variable, ¼in. to ½in. in diameter, flabellately three to five-cleft, with simple, obtuse or sub-acute teeth, or broader and deeply three to five-lobed, with the lobes three or more toothed; petioles ½in. to 1in. long. *h.* 3in. to 6in. Spain, &c., 1862. See Fig. 426. (B. M. 6640.) SYN. *S. Wallacei* (of gardens).

S. ceratophylla (horn-leaved). A synonym of *S. trifurcata*.

S. cernua (drooping). *fl.* white, ¼in. to ½in. in diameter, drooping; calyx lobes erect, obtuse; petals obovate. July. *l.* petioled, reniform, palmately deeply crenate or lobulate; radical ones ½in. to ¾in. in diameter, often tinged with red; cauline ones sessile,

Saxifraga—*continued.*

with axillary, scarlet buds. Stem erect, simple, one to three-flowered. *h.* 2in. to 6in. Europe (Britain), America, &c. The flowers are rarely produced in this country. (Sy. En. B. 554.)

S. ciliata (ciliated). A variety of *S. ligulata*.

S. cordifolia (heart-shape-leaved). *fl.* red, large; petals roundish. March to May. *l.* orbicularly cordate, serrated, glabrous. *h.* 1ft. Siberia, 1779.

S. cortusæfolia (Cortusa-leaved).* *fl.* white, unspotted, on slender pedicels; petals linear, the one to three longer ones ½in. to ¾in. long; scape stout, bearing an open panicle often 7in. to 8in. long. October. *l.* on stout petioles, orbicular, cordate or sub-reniform at base, 2in. to 3in. in diameter, shallowly five to many-lobed, bright green above, fading to bright red-brown or red. Japan, 1883. Plant stemless, probably very variable. (B. M. 6680.)

FIG. 427. SAXIFRAGA COTYLEDON, showing Habit, and detached Flower and Leaf.

S. Cotyledon (Cotyledon).* *fl.* white, dotless, large; calyx densely glandular; petals conspicuously three-nerved, oblong-spathulate. May to July. *l.* flat, spathulate, cartilaginously serrated, the edges silvery. Stem erect, branched in a pyramidal form, many-flowered. *h.* 1ft. to 2ft. Alps, 1596. Plant tufted. See Fig. 427. (F. d. S. 1443.) *S. nepalensis* (of gardens) and *S. pyramidalis* are simply robust forms of this species.

S. crassifolia (thick-leaved).* *fl.* red, large, disposed in thyrsoid panicles; petals elliptic-oblong. March to May. *l.* large, fleshy, oval or obovate, very blunt, glabrous, serrulated. Root thick and woody. *h.* 1ft. Siberia, 1765. See Fig. 428. (B. M. 196.)

S. cuscutæformis (Cuscuta-like). *fl.* white; calyx very short, spreading; petals very shortly clawed, lanceolate-elliptic; panicle branches two or three-flowered; scape slender, ascending, loosely secund-paniculate below the middle. June and July. *l.*, basal ones rather thick, sub-orbicular or ovate, deeply or undulately toothed. *h.* 6in. Japan, 1815. (B. M. 2631; L. B. C. 186.)

S. Cymbalaria (Cymbalaria). *fl.* citron-yellow; petals cordate at base, distinctly unguiculate, thrice as long as the calyx segments. May to August. *l.* brown-striated; lower ones nearly twice as long as the petioles, reniform, seven to eleven-lobed, the middle lobe largest; upper ones shortly petiolate, five to seven-lobed. Stems nearly erect, or more or less flexuous, branched. Himalayas, &c.

S. decipiens (deceptive). *fl.*, calyx lobes ovate, obtuse, as long as the tube. *l.* of all the shoots rosulate, three to seven-cleft; lobes abruptly acuminate. This is regarded by Hooker as a sub-species of *S. hypnoides*. (L. B. C. 151); Sy. En. B. 557.) *gemmifera* (Sy. En. B. 562) and *platypetala* (Sy. En. B. 561) are varieties.

S. densa (dense). A synonym of *S. bronchialis*.

S. diapensioides (Diapensia-like). *fl.* white, three, four, or five, campanulate, disposed in a terminal head; petals narrow at the base, the limb orbicular. April to June. *l.* linear, erect, keeled, aggregate, imbricated, cretaceously glaucous, cartilaginous on the margins, ciliated at base, and with one or two perforated dots at the obtuse apex. Stem many-leaved, few-flowered. *h.* 1½in. Alps, 1825. Plant densely tufted.

Saxifraga—*continued.*

S. diversifolia (variable-leaved).* *fl.* yellow, obscurely spotted, ½in. to ¾in. in diameter, pedicellate, erect; petals twice as long as the sepals, spreading and recurved; corymb few or many-branched and flowered, the branches erecto-patent. July. *l.*, radical ones long-stalked, 1in. to 2in. long, ovate or cordate, acute; cauline ones sometimes very numerous, smaller, sessile, semi-amplexicaul. Stem erect, 6in. to 16in. high, simple or corymbosely branched above. India, &c., 1882. (B. M. 6603.)

S. elongata (elongated). A form of *S. virginiensis*.

S. flagellaris (whip-like). *fl.* yellow; petals permanent. May to July. *l.*, radical and lower cauline ones obovate-spathulate upper ones rather villous. Stems erect, simple, one to five-flowered, and (as well as the calyces) glandular-pubescent. Stolons or flagellæ filiform. *h.* 3in. Caucasus, &c., 1819. (B. M. 4621; L. J. F. 237.)

S. florulenta (slow-flowering). *fl.* pale lilac, ½in. long, slightly nodding; petals twice as long as the calyx lobes, spathulate, obtuse; panicle narrow, thyrsoid, 5in. to 12in. high, more or less densely hairy. Rarely produced. *l.* ¾in. to 2in. long, innermost ones the shortest, very numerous, densely imbricated, spathulate, mucronate, bristly-ciliate below. Rosettes 5in. to 7in. in diameter. Maritime Alps. "A striking species, but exceedingly difficult to grow. It probably lives to a great age before flowering, after which it dies" (Hooker). (B. M. 6102; R. G. 782.)

S. Fortunei (Fortune's).* *fl.* white, disposed in an erect, many-flowered panicle; petals very unequal, one or more being elongated and saw-edged. *l.* reniform-cordate, lobed and laciniately toothed. Japan, 1863. A pretty, half-hardy perennial, with the habit of *S. cortusæfolia*. See Fig. 429. (B. M. 5377; F. M. 221.)

FIG. 428. SAXIFRAGA CRASSIFOLIA.

S. geranioides (Geranium-like). *fl.* white, numerous, sub-corymbose; calyx segments erect, longer than the tube; petals obovate-oblong, long-clawed, about twice as long as the calyx. July. *l.*, lower ones slightly pilose, sub-orbicular-reniform, palmately trifid, the lateral lobes bifid, entire or two or three-toothed; cauline ones cuneate-ovate, with narrow lobes. Stems numerous, slightly woody. *h.* 6in. Pyrenees, 1770. (R. G. 999.)

S. Geum (Geum). *l.* orbicular, more or less reniform or cordate, crenate or toothed, on slender petioles. According to Hooker, this is merely a sub-species of *S. umbrosa*. (Sy. En. B. 543-545.) *elegans* and *gracilis* are varieties.

S. granulata (granulate).* Fair Maids of France; First of May; Meadow Saxifrage. *fl.* white, inclined or drooping, campanulate, 1in. in diameter; petals obovate. April and May. *l.* petioled, reniform, palmately lobulate; radical ones ¾in. to 1½in. in diameter, on slender petioles; cauline ones sessile, deeper and more acutely cut. Stem 6in. to 18in. high, erect, bulbiferous at base, branched and many-flowered above. Europe (Britain), &c. (Sy. En. B. 555.) There is a pretty double form of this species in cultivation.

S. Guthrieana (Guthrie's). A hybrid, very similar to, or identical with, *S. Andrewsii*.

S. hieracifolia (Hieracium-leaved). *fl.* white; petals ovate, acute; scape erect, racemose, the branches four to six-flowered

Saxifraga—*continued.*

June and July. *l.* nearly all basal, ovate-oblong or oblong, remotely repand-toothed, dilated at base, semi-amplexicaul, glabrous above, villous beneath and on the margins. *h.* 1ft. Europe, &c., 1789.

S. Hirculus (Hirculus).* *fl.* ½in. to ¾in. in diameter, sub-solitary; sepals reflexed; petals obovate, dotted with red at the base, where there are two tubercles. August. *l.*, radical ones ½in. to 1in. long, rosulate, petioled, lanceolate or spathulate; cauline ones linear, sometimes faintly serrated. Stem sub-simple, erect, stoloniferous. *h.* 4in. to 8in. Arctic and Alpine Europe (Britain), &c. (Sy. En. B. 550.)

S. H. grandiflora (large-flowered). A fine variety, having flowers 1in. in diameter. (R. G. 1035, Fig. 4.)

S. hirsuta (hairy). *l.* long-petioled, broadly ovate, rounded at base or narrowed into the petiole; margins cartilaginous, sharply toothed or serrated. Plant more hairy than *S. umbrosa*, to which it is referred, by Hooker, as a sub-species. (Sy. En. B. 546.)

S. hirta (hairy). A sub-species of *S. hypnoides.*

S. Hostii (Host's).* *fl.* five to nine in a corymb; calyx segments ovate-triangular; petals white, or with a few purple dots above the middle, oblong or obovate-oblong; pedicels glandular. May. *l.*, basal ones numerous, ligulate, obtuse at apex, ciliated at base; cauline ones oblong, crenate-serrated. Stem erect, paniculate above. *h.* 6in. to 12in. South Europe.

S. hypnoides (Hypnum-like).* Dovedale Moss; Eve's Cushion, &c. *fl.* white, ½in. to 1in. in diameter, campanulate; flowering shoots 3in. to 18in. long, stout or slender. May to July. *l.* cuneate, three to five-cleft, loose or dense, with the broad, compressed petioles ½in. to 1in. long; lobes entire, or the lateral ones cleft, flat or channelled. Europe (Britain), &c. The tufts often form large cushions.

FIG. 429. SAXIFRAGA FORTUNEI, showing Habit and detached Flowers.

S. h. hirta (hairy). *fl.*, calyx lobes broad; petals obovate, flat. *l.* three-lobed; lobes linear, suddenly contracted beyond the middle, acute. (Sy. En. B. 559.) *affinis* (Sy. En. B. 560) and *incurvifolia* (Sy. En. B. 558) are varieties.

S. h. Sternbergii (Sternberg's). Barren shoots rather long, their leaves with three to five obtuse lobes. A robust variety.

S. imbricata (imbricated). *fl.* white, solitary, terminal; petals obovate, with attenuated claws, trinerved. June and July. *l.* small, hollowed, ovate-oblong, sub-triquetrous at apex, ciliate-serrulate on the margins. *h.* 3in. India, 1843. Plant very densely tufted.

S. intacta (intact). A synonym of *S. Aizoon.*

S. irrigua (watered). *fl.* white, large, campanulate; petals spathulate; panicle loose, many-flowered. June and July.

Saxifraga—*continued.*

l., radical ones palmately five-parted; cauline ones trifid, sessile; segments cuneate-oblong, mucronate, trifid. Stems beset with jointed hairs. *h.* 6in. to 12in. Tauria, 1817. (B. M. 2207.)

S. juniperifolia (Juniper-leaved). *fl.* yellow or greenish-yellow, racemose or spicate-capitate; petals slightly exceeding the calyx segments, oblong-spathulate. July. *l.*, those of the woody caudex rigid, erect, appressed, subulate, rather broader at base, rigidly mucronate; cauline ones long-ciliated at base. Stems leafy, villous. Caucasus, &c.

S. Kotschyi (Kotschy's). *fl.* yellow, in cymes terminating the short, leafy stems. *l.* small, closely imbricated, obovate-obtuse, apiculate. Asia Minor, 1873. A hardy or half-hardy, bluish-green plant, forming densely-tufted rosettes, ¼in. to ½in. across. (B. M. 6065.)

S. leucanthemifolia (Leucanthemum-leaved). *fl.* in a spreading, corymbose or paniculate cyme; petals white, lanceolate, unequal, the three larger ones with a heart-shaped base and a pair of spots; the two smaller ones with a tapering base and no spots. June. *l.* oblong, wedge-shaped or spathulate, coarsely toothed or cut, tapering into a petiole. *h.* 5in. to 18in. North America, 1812. (B. M. 2959; L. B. C. 1568.)

S. ligulata (strap-shaped).* *fl.* very pale red, almost white, in a dichotomous panicle; petals broad, orbicular. March to May. *l.* obovate, sub-cordate, denticulated, quite glabrous on both surfaces, but ciliated on the margins. *h.* 1ft. Nepaul, 1821. (B. M. 3406; H. E. F. 49; L. B. C. 747; S. B. F. G. 59.)

S. l. ciliata (ciliated). This practically only differs from the type in its somewhat smaller size, and in the leaves being hairy on both surfaces. Nepaul and Kumaon. (B. M. 4915, under name of *S. ciliata.*)

S. lingulata (tongue-shaped). *fl.* white, with numerous rose-coloured dots, flat; calyx densely glandular, as well as the peduncles; petals oval, conspicuously triple-nerved. May to July. *l.* linear-lingulate, channelled, tubercularly crenated, glaucous, ciliated at base, recurved at apex. Stem erect, flexuous, fastigiately branched. *h.* 1ft. to 1½ft. Alps, 1800.

S. l. cochlearis (spoon-like).* *fl.* white, in slender panicles; peduncles (as well as the branches) purplish brown, glandular-pubescent. June. *l.* ¼in. to 1in. long, spathulate, coriaceous, in tufted rosettes. Maritime Alps, 1883. (B. M. 6688.)

FIG. 430. SAXIFRAGA LONGIFOLIA.

S. longifolia (long-leaved).* *fl.* white, slightly dotted with red, disposed in a close, pyramidal thyrse, 1ft. high. July. *l.* linear-oblong, 6in. long, of thick substance, densely rosulate, having cartilaginous margins. Pyrenees, 1871. See Fig. 430. (B. M. 5889.)

S. marginata (margined). *fl.* white, ½in. in diameter, disposed in small, rather compact cymes. July. *l.* small, oblong, dotted on the margins with a series of lime incrustations, disposed in dense rosettes. Stem purplish, 2in. to 4in. high. Italy and Greece, 1883. (B. M. 6702.)

S. Maweana (Maw's).* *fl.* white, ¾in. in diameter, shortly pedicellate; peduncles erect, 4in. to 6in. long; petals obovate-spathulate, rounded at the tips. May and June. *l.* on flattened petioles, ½in. to 2in. long; lower ones loosely rosulate, oblong-reniform, three-cleft to the middle, or with the lateral lobes cleft;

Saxifraga—*continued.*

upper radical leaves cuneate, trifid, with pedicelled, thickened leaf-buds in their axils. Tetuan, 1827. A well-known and highly-prized rock plant. (B. M. 6384; G. C. 1871, p. 1355.)

S. media (intermediate). *fl.*, calyx and peduncle purplish, densely glandular; petals erect, obovate, three to five-nerved, scarcely exceeding the calyx segments; inflorescence cymose-paniculate or racemose. June and July. *l.*, basal ones imbricated, explanate-depressed, spathulate-lingulate, acute or obtuse; cauline ones spathulate, glabrous, except the apical part. Stems erect. *h.* 6in. to 8in. Pyrenees. (G. C. n. s., xxiii. 801; S. F. G. 376.)

S. moschata (musky).* *fl.* pale yellowish or purplish, one to ten, racemose or paniculate; petals spreading, oblong, scarcely exceeding the calyx segments. May and June. *l.* smooth, glabrous or glandular-pilose, entire, obtuse or cuneate, trifid, rarely five-fid with linear lobes, obtuse; cauline ones scattered, trilobed or entire. *h.* 3in. Pyrenees, &c., 1819. SYN. *S. muscoides.*

S. muscoides (Musk-like). A synonym of *S. moschata.*

S. mutata (changeable). *fl.* copper-coloured, marked with deeper-coloured dots, panicled; calyx and peduncle densely glandular; petals linear-lanceolate. June and July. *l.* flat, spathulate, cartilaginously crenated, fringed with long, viscid hairs; cauline ones obovate, ciliated at base. Stem erect, leafy, glandular. *h.* 6in. to 12in. Switzerland, 1779. (B. M. 351.)

S. nepalensis (Nepaul). A garden form of *S. Cotyledon.*

S. nivalis (snowy). *fl.* white, ¼in. in diameter, in capitate, four to twelve-flowered cymes; scape erect, simple, 3in. to 6in. high. July and August. *l.* broadly spathulate, crenate-toothed, ½in. to 1in. in diameter, sub-coriaceous, red beneath; petioles 1in. to 2in. long. Europe (Britain), &c. (Sy. En. B. 541.)

S. oppositifolia (opposite-leaved).* *fl.* bright purple, ½in. in diameter, solitary, sessile, on short, annual shoots, campanulate; petals obovate. April and May. *l.* opposite, ¼in. long, quadrifariously imbricated, thickened and obtuse at the tip, ciliated with stout bristles. Stems 6in. to 8in. long, creeping, leafy. Europe (Britain), &c. (L. B. C. 869; R. G. 1039; Sy. En. B. 540.)

S. o. alba (white-flowered). This only differs from the type in the colour of its flowers.

S. o. major (larger). A form with larger flowers than the type, but not so fine as the next variety.

S. o. pyrenaica superba (superb Pyrenean).* The rosy-lilac flowers of this form are very large, more than twice the size of those of *S. oppositifolia*, and the habit is more erect. (G. C. n. s., xxi. p. 419.)

S. pallida (pale). *fl.* white; petals persistent during the ripening of the fruit; ovary dull purplish-red; peduncles one to four-flowered, 1in. to 4in. high. Summer. *l.* spathulate, green, disposed in a small rosette. *h.* 3in. to 6in. Sikkim, 1885. A neat, rockwork plant.

S. paradoxa (paradoxical). A synonym of *S. pygmæa.*

FIG. 431. SAXIFRAGA PELTATA, showing Habit and detached Flower.

S. peltata (peltate-leaved).* Umbrella Plant. *fl.* white or very pale pink, ½in. in diameter; petals longer than the sepals, elliptic, rounded at both ends. April. *l.* all sub-terminal, erect; petiole 1ft. to 2ft. long, cylindric, as thick as a goose-quill, glandular-pubescent; blade orbicular, peltate, 6in. in diameter, six to ten-lobed, the lobes cut and sharply toothed, pale beneath. Rootstock clothed at the tip with the broad, stipular leaf-sheaths.

Saxifraga—*continued.*

California, 1873. One of the largest species of the genus. See Fig. 431. (B. M. 6074; F. d. S. 2441; R. G. 735.)

S. pennsylvanica (Pennsylvanian). Swamp Saxifrage. *fl.* greenish, small; calyx lobes as long as the petals; scape many-flowered, erect, clammy-pubescent. May and June. *l.* clustered at the root, oblanceolate, obscurely toothed, 4in. to 8in. long, narrowed at base into short, broad petioles. *h.* 1ft. to 2ft. North America, 1732.

S. pentadactylis (five-fingered). *fl.* white, disposed in loose panicles; petals obovate, with branched nerves. May and June. *l.* on long, compressed petioles, glabrous, five-parted. Stems branched, terete, glabrous, flexuous. *h.* 3in. to 6in. Pyrenees. 1815. Plant densely tufted.

S. petræa (rock-loving). A synonym of *S. adscendens.*

FIG. 432. SAXIFRAGA PURPURASCENS.

S. purpurascens (purplish).* Purple Large-leaved Saxifrage. *fl.* purple, ¾in. to 1in. across, nodding; petals obovate-oblong, sometimes long-clawed; panicle few-flowered, corymbose, glandular-pubescent. June. *l.* obovate-rounded, entire, 2in. to 3in. long, highly glabrous, sometimes obscurely sinuated, often impressed with dots. *h.* 3in. to 6in. Himalayas, 1850. See Fig. 432. (B. H. ix. 1; B. M. 5066; F. d. S. 1401.) SYN. *Megasea purpurascens.*

FIG. 433. SAXIFRAGA PYGMÆA.

S. pygmæa (pigmy).* *fl.* yellowish, very small; petals hardly longer than the calyx. May and June. *l.* lanceolate, nerveless, glabrous, blunt, and rather cut at the apex. Stems filiform, slender, three or four-flowered, few-leaved, glandular. *h.* 1in to 2in. Pyrenees (not British). See Fig. 433. SYN. *S. paradoxa.*

S. pyramidalis (pyramidal). A form of *S. Cotyledon.*

S. retusa (retuse-leaved).* *fl.* purple; petals triple-nerved, acute, much shorter than the style. May and June. *l.* imbricated, oblong, trigonal, acute, full of perforated dots above, ciliated at the base. Stems few-leaved, erect. *h.* 1½in. Alps, 1826. (R. G. 1110; S. B. F. G. ser. ii. 49; A. F. P. 21, Fig. 2, under name of *S. purpurea.*)

Saxifraga—*continued.*

S. rivularis (brook-loving). *fl.* white, erect, one or two, ¼in. in diameter; petals distant. July and August. *l.* reniform, palmately five-lobed, ½in. to 1in. in diameter; lobes entire; petioles as long as the decumbent, rooting stems. Britain, &c. (F. D. 118; Sy. En. B. 553.)

S. Rocheliana (Rochel's). *fl.* white, corymbose; petals obovate, twice as long as the calyx. Summer. *l.* white at the edges, and with distinct, impressed dots; lower ones lingulate, glabrous, ciliated at the base, disposed in tufts; cauline ones pale green, clothed with clammy hairs. *h.* 3in. Austria.

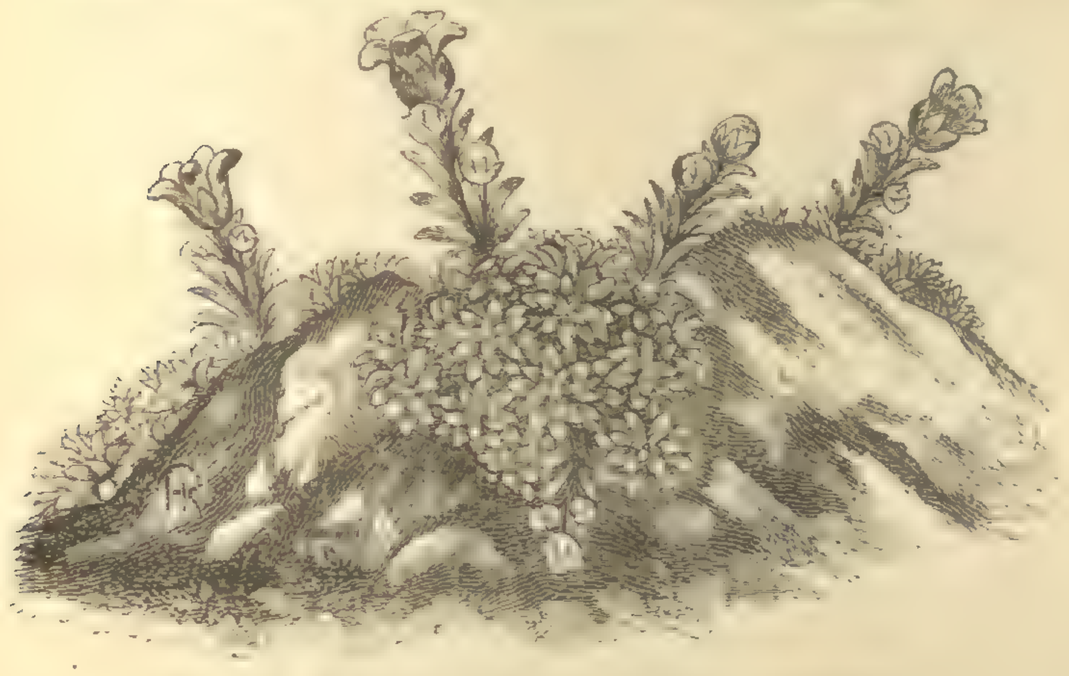

FIG. 434. SAXIFRAGA ROCHELIANA CORIOPHYLLA.

S. R. coriophylla (Coris-leaved).* *l.*, lower ones smaller and more horizontally expanded than in the type, pitted near the margins. See Fig. 434.

S. rotundifolia (round-leaved). *fl.* white, marked with scarlet dots; petals lanceolate, acute, three-nerved. May and June. *l.* reniform, unequally and coarsely toothed; cauline ones petiolate. *h.* 1ft. Austria, &c., 1596. (B. M. 424; S. F. G. 377.) The variety *repanda* is larger and more robust, and has broader leaves.

S. r. taygetea (Mount Taygetus). *fl.*, panicle branches one or two-flowered. *l.*, basal ones long-petiolate, small, with slightly hairy margins, reniform or nearly round, five to nine-lobed; upper cauline ones linear or trifid. Greece.

S. sancta (holy).* *fl.* yellow, in a short, dense spike; petals spathulate-oblong. Summer. *l.* rigid; lower ones imbricated, spreading, lanceolate, acuminate, rigidly mucronate, ciliate, denticulate on the margins, keeled; cauline ones lanceolate, mucronate. Stem glabrous, leafy. Mount Athos, 1882. Habit dense, tufted.

FIG. 435. SAXIFRAGA SARMENTOSA TRICOLOR.

S. sarmentosa (sarmentose).* Aaron's Beard; Creeping Sailor; Mother of Thousands; Old Man's Beard; Wandering Jew, &c.

Saxifraga—*continued.*

fl. white, two of the inner petals having a yellow spot, and the central one two scarlet spots, at the base; two outer petals large, flaccid. June and July. *l.* orbicularly cordate, crenate-lobed, pilose, red beneath. Stolons or runners creeping. *h.* 9in. China and Japan, 1815. Half-hardy. (B. M. 92.)

S. s. minor (smaller). A smaller-growing form. (B. H. vii. 13, under name of *S. s. minor semperflorens.*)

S. s. tricolor (three-coloured). This differs from the type in having the foliage beautifully blotched with creamy-white and red. It is well adapted for growing in vases and hanging baskets. See Fig. 435.

S. Schmidtii (Schmidt's). *fl.* purplish, paniculate, similar to those of *S. crassifolia.* Early summer. *l.* ovate, rounded at both ends, or attenuated into the petioles, denticulate-ciliated. Himalayas. (R. G. 946.)

S. spathulata (spathulate-leaved). *fl.*, petals obovate-oblong, twice as long as the calyx segments; panicle corymbose, three to five-flowered. June. *l.*, lower ones spathulate, ciliated, entire, obtuse at apex, rarely three-toothed, three-nerved; cauline ones linear. Stem slender, erect. Algiers.

S. squarrosa (squarrose-leaved). *fl.* white, larger than those of *S. cæsia.* Early summer. *l.* linear-elliptic, rather retuse, stiff, squarrosely imbricated, permanent, mealy when young. Stem pubescent below, usually three-flowered; branches diffuse, flaccid. Alps.

S. stellaris (starry). *fl.* few, ½in. in diameter; petals white, with two purple spots above the base; scape 3in. to 8in. high; cyme panicled. *l.* rosulate, sub-sessile, cuneate-lanceolate, ½in. to 1in. long, sub-succulent, usually coarsely toothed, ciliated, casually entire. Europe (Britain), &c. Plant glabrous or sparsely hairy stemless. (F. D. 23; Sy. En. B. 542.)

S. Sternbergii (Sternberg's). A form of *S. hypnoides.*

S. Stracheyi (General Strachey's).* *fl.* pink, ¾in. to 1in. in diameter; petals obovate-spathulate or orbicular; panicle much-branched, drooping, glandular pubescent. March. *l.* closely sheathing at base, with orbicular stipular sheaths, obovate or obovate-cuneate, 3in. to 6in. long, narrowed into the short, stout petiole, or cordate at base; margins irregularly toothed, ciliated. *h.* 4in. to 8in. Western Himalayas, 1851. (B. M. 5967.) *S. S. alba* (R. G. 1228) differs from the type in its less spreading, white petals, whitish filaments, and green styles.

S. S. Milesii (Miles'). *fl.* white; calyx and peduncle glandular-pubescent; petals white, with a distinct claw; corymbs dense. March. *l.* 9in. to 12in. long, 4in. to 5in. broad. 1872. A plant of garden origin. This resembles the type, but differs in its longer leaves, and the more distinct claw to its petals.

S. S. thysanodes (coarse-fringed). *fl.* white, clustered in a small, slightly branched raceme; petals sub-rotundate, longer than the sepals. April. *l.* obovate, deeply crenate-serrated, hairy on both sides, but especially beneath. *h.* 6in. to 8in. India. (B. R. 1846, 33.)

S. tenella (slender). *fl.* white; petals obovate-oblong, twice as long as the calyx segments; panicle few-flowered. June and July. *l.* linear-subulate, cuspidate-aristate, sparsely setulose-ciliated on the margins or glabrous, glandularly ciliated towards the base. Stems erect, slender, glabrous. *h.* 6in. Alps, 1819.

FIG. 436. SAXIFRAGA TRIFURCATA, showing Habit and detached Leaf.

S. trifurcata (thrice-forked). *fl.* white, long-stalked; petals thrice as long as the calyx, obovate-oblong. May. *l.* viscid, twice as long as the petioles, palmately three-parted, nerved; lateral lobes sub-trifid; middle one cuneate, three-toothed; cauline leaves few, shortly petiolate, trifid. *h.* 6in. Spain, 1804. See Fig. 436. SYN. *S. ceratophylla* (B. M. 1651).

Saxifraga—*continued.*

S. umbrosa (shade-loving).* London Pride; None-so-Pretty; St. Patrick's Cabbage, &c. *fl.* white, sometimes sprinkled with red, ¼in. in diameter, in a panicled cyme; sepals reddish; scape 6in. to 12in. high, leafless. June and July. *l.* petioled, orbicular or broadly ovate, coarsely crenate or toothed, rosulate, ½in. to 2in. in diameter; petioles ½in. to 1in. long. Ireland, Spain, and Portugal. A common plant in gardens. *punctata* and *serratifolia* are varieties.

S. valdensis (Lyons).* *fl.* white, comparatively large, corymbose, borne on short, hairy peduncles. May and June. *l.* dense, short, flat at the base, but more or less triquetrous at the apex, the upper surface marked with irregular dots. *h.* 3in. Alps of Lyons, &c., 1871.

FIG. 437. SAXIFRAGA VIRGINIENSIS, showing Habit and detached Portion of Inflorescence.

S. virginiensis (Virginian).* *fl.* white; petals oblong, obtuse, twice as long as the erect calyx lobes; cyme clustered, at length open and loosely panicled. April to June. *l.* obovate or oval-spathulate, narrowed into broad petioles, rather thick, crenate-toothed. *h.* 4in. to 9in. North America, 1790. See Fig. 437. (B. M. 1664; L. B. C. 1699.) *S. v. flore-pleno* is a pretty garden variety, with compact, double flowers. (R. G. 1092.) *S. elongata* is another form.

S. Wallacei (Wallace's), of gardens. A synonym of *S. Camposii.*

SAXIFRAGE. *See* **Saxifraga.**

SAXIFRAGEÆ. A natural order of trees, shrubs, or herbs, of variable habit, inhabiting temperate and frigid regions, rare in the tropics. Flowers hermaphrodite, rarely unisexual or polygamo-dicœcious; calyx five-parted, rarely four to twelve-parted, free or adnate with the ovary, the lobes valvate or imbricated; petals generally four or five, rarely wanting, perigynous, rarely epigynous, very rarely hypogynous, often small, imbricated or valvate; stamens as many, or twice as many, as the petals, rarely indefinite, erect or spreading; filaments free; anthers usually didynamous. Fruit capsular or baccate, rarely follicular, very rarely nut-like. The useful properties of *Saxifrageæ* are unimportant. The order is divided, by Bentham and Hooker, into six tribes: *Cunonieæ*, *Escallonieæ*, *Francoeæ*, *Hydrangeæ*, *Ribesieæ*, and *Saxifrageæ* proper. It embraces about seventy-five genera, and 540 species. Well-known examples are: *Astilbe*, *Cunonia*, *Escallonia*, *Francoa*, *Hydrangea*, *Ribes*, and *Saxifraga*.

SAXIFRAGE, BURNET. *See* **Pimpinella.**

SAXIFRAGE, GOLDEN. *See* **Chrysosplenium.**

SAXIFRAGE, MEADOW. A popular name for *Saxifraga granulata*, the genus *Seseli*, and *Silaus pratensis.*

SAXOFRIDERICIA (named in honour of Frederick Augustus, King of Saxony). ORD. *Rapateaceæ.* A genus comprising five species of robust, stove herbs, natives of Guiana and North Brazil. Flowers in sessile heads;

Saxofridericia—*continued.*

calyx tube hyaline, the lobes rigid, paleaceous; corolla tube hyaline, the lobes broad; involucral bracts two, membranous, readily parting; scape tall, often thickened under the head. Leaves radical, long, petiolate or sessile in a sheath. Only one species has yet been introduced. It thrives in a compost of loam and peat, and requires to be kept wet, as it is a marsh plant. Propagated by division.

S. subcordata (sub-cordate). *fl.* densely brown-spotted, sessile, in semi-globose, mediocre heads; spathe red, bivalved, at length splitting. *l.* distichous, ancipitous at base, then petiolate, oblong, acuminate, sub-cordate at base, 6in. or more long; petioles spiny-edged, glabrous. *h.* 1ft. Amazon, 1873. (G. C. n. s., i. 275.) SYN. *Rapatea pandanoides* (I. H. xx. 153-154).

SCAB. A disease of Potato tubers, due to the growth on them of a Fungus named *Tubercinia scabies.* It gives rise to brown, dry crusts or scabs. For an account of the disease, *see* **Potato** (FUNGI).

SCABIOSA (from *scabies*, the itch, which disease the common species is said to cure). Pincushion Flower; Scabious. Including *Asterocephalus*, *Knautia*, *Pterocephalus*, and *Succisa.* ORD. *Dipsaceæ.* A genus comprising, according to the authors of the "Genera Plantarum," not more than eighty distinct species of mostly hardy, annual or perennial herbs, sometimes more or less shrubby at base. Flower-heads blue, rose, purple, yellowish-white, or white, terminal; involucral bracts in one or two series; involucels two, four, or eight-ribbed; calyx bristly; corolla limb four or five-fid, sub-equal, or

FIG. 438. INDIVIDUAL FLOWER OF SCABIOSA.

often oblique or bilabiate (see Fig. 438); stamens four, very rarely two, all perfect. Leaves entire, toothed, lobed, or dissected. A great many species have been introduced, but the selection given below comprises the best-known. They succeed in ordinary garden soil, and may be increased by seeds, also sometimes by division. *S. atropurpurea* and its varieties are most useful subjects for cutting, and plants may be grown in pots for winter flowering with good effect. For this purpose seeds should be sown in June or July, and the plants, when large enough, potted off singly and grown in a cool frame. For flowering outside in summer, sow in March or early in April. *S. caucasica* is a very handsome border plant. The species described below are hardy perennials, except where otherwise indicated.

S. amœna (pleasing).* *fl.-heads* lilac or rose; corollas radiant peduncles elongated, villous under the heads. June and July. *l.*, radical ones obovate, toothed or lyrate, rather hairy; cauline ones pinnatifid, with lanceolate, acute, nearly entire lobes. *h.* 2ft. to 3ft. Russia, 1820.

S. arvensis (field-loving). Egyptian or Gipsies' Rose, &c. *fl.-heads* pale lilac or blue, 1in. to 1½in. in diameter, depressed; corollas hairy, the inner redder; peduncles long, stout. July to September. *l.* variable, hairy; radical ones oblong-lanceolate, entire, serrated, or crenate; cauline ones toothed, lobed, or pinnatifid. Stem 2ft. to 5ft. high, stout, hairy. Europe (Britain), &c. (Sy. En. B. 679.)

S. atropurpurea (dark purple).* Mournful Widow; Sweet Scabious, &c. *fl.-heads* normally deep crimson, very sweet-scented; corollas radiant, a little longer than the involucre. July and August. *l.*, radical ones lanceolate-ovate, lyrate, coarsely-toothed; cauline ones pinnatipartite, with oblong, toothed or cut lobes. Stem branched. *h.* 2ft. to 3ft. South-western Europe, 1629. A very handsome, hardy annual. Under the name of *Saudade*, the flowers of this species are largely employed by the Portuguese, Brazilians, &c., for funeral wreaths, and similar purposes. See Fig. 439. (B. M. 247.) There are several desirable varieties: *flore-pleno* has double, purple or white

Scabiosa—*continued.*

flowers (F. d. S. 1203); *foliis-aureis* has very distinct, yellow leaves; *nana* is not more than 1ft. high, and very compact; *striata* has flowers spotted and streaked; two other forms have flowers white, and purple margined with white, respectively.

FIG. 439. UPPER PORTION OF PLANT OF SCABIOSA ATROPURPUREA.

S. caucasica (Caucasian).* *fl.-heads* pale blue, fully 3in. in diameter, radiant; corollas five-cleft; involucre very villous. June to August. *l.*, radical ones lanceolate, acuminate, quite entire, glaucous. *h.* 1ft. Caucasus, 1803. See Fig. 440. (B. M. 886.)

FIG. 440. SCABIOSA CAUCASICA.

S. c. elegans (elegant). *l.* whitish; cauline ones undivided, quite entire or nearly so. (R. G. 1212.)

Scabiosa—*continued.*

S. c. heterophylla (variable-leaved). *fl.-heads* pale purple, large. *l.* hairy, pinnatisect; segments linear-lanceolate, acute. 1883. (R. G. 1084.)

S. Columbaria (Columbaria). *fl.-heads* lilac or blue-purple, 1in. to 1½in. in diameter; corollas pubescent, those of the inner flowers regular, of the outer ones rayed; peduncles slender. July to September. *l.* glabrous or pubescent, very variable; radical ones narrow, petiolate, entire or divided; cauline ones pinnatifid, the segments often cut. *h.* 1ft. to 2ft. Europe (Britain), &c. (Sy. En. B. 678.)

S. graminifolia (grass-leaved). *fl.-heads* pale blue, very like those of *S. caucasica*, but much smaller. June to October. *l.* linear-lanceolate, quite entire, of a silvery-white colour. Stems suffruticose at base. *h.* 1ft. South Europe, 1683. This species is well adapted for the border or rockery. (B. R. 835.)

S. pterocephala (wing-headed). *fl.-heads* purple, 1in. to 1½in. in diameter; peduncles stout, 2in. to 3in. long. Summer. *l.* simple, elliptic, or lyrate-pinnatifid, crenately-toothed. Greece, 1881. A very ornamental, dwarf, tufted perennial. (B. M. 6526.)

S. succisa (Devil's Bit). Blue Bonnets; Blue Buttons, &c. *fl.-heads* blue-purple or white, ⅔in. to 1½in. in diameter; involucral bracts shorter than the hairy corollas; peduncles appressedly-hairy. July to October. *l.* entire, glabrous or hairy; radical ones oblong or obovate, petiolate; cauline ones few, toothed. *h.* 1ft. to 2ft. Europe (Britain), &c. (Sy. En. B. 677.)

S. Webbiana (Webb's).* *fl.-heads* creamy-yellow, on long peduncles; corollas nearly equal. July. *l.*, lower ones petiolate, obovate, crenate; upper ones pinnatifid, with ovate or oblong, entire lobes. *h.* 6in. Phrygia, 1818. Plant clothed with soft, silky, hoary tomentum. (B. R. 717.)

SCABIOUS. *See* **Scabiosa.**

SCABIOUS, SHEEP'S-BIT. A common name for *Jasione montana*.

SCABIOUS, SWEET. *See* **Scabiosa atropurpurea.**

SCABRID. Rather rough.

SCABROUS. Rough.

SCABWORT. An old name for Elecampane (*Inula Helenium*).

SCÆVOLA (from *scæva*, the left hand; alluding to the form of the corolla). ORD. *Goodenovieæ*. A genus comprising nearly sixty species of stove or greenhouse shrubs, sub-shrubs, or perennial herbs, mostly Australian; eight or ten are found in the Pacific Islands and maritime Asia, and one also in Africa and the West Indies. Flowers solitary between two bracteoles, sessile or pedunculate, in the axils of the leaves or subtending bracts, or the peduncles dichotomously branched with a flower in each fork; calyx tube adnate, the limb usually very short; corolla oblique, the tube slit open to the base on the upper side, the lobes nearly equal or the upper ones shorter; stamens free; indumentum stellate or simple. Leaves alternate or rarely opposite, entire or toothed. A selection of the species best known to gardeners is given below. They succeed in a compost of turfy loam, peat, and sand. Propagation may be effected by cuttings, inserted in similar soil, under a hand glass, those of *P. Plumieri* being placed in heat. Except in the case of the species just named, all those here described are Australian, and require greenhouse treatment.

S. anchusæfolia (Anchusa-leaved). *fl.* blue, sessile or nearly so, in a terminal, leafy spike; calyx limb obsolete; corolla ½in. or more long, hairy outside, bristly within. May. *l.* linear or oblanceolate, entire or coarsely-toothed when broad, 1in. to 2in. or more long; floral ones less than ½in. long. An erect or prostrate herb or sub-shrub.

S. attenuata (attenuated). *fl.* blue, sessile, in terminal, leafy spikes, at length long and interrupted; calyx limb prominent, annular; corolla ½in. long, hairy within, the throat softly bristly. June. *l.* petiolate; larger ones broadly lanceolate, few-toothed, 2in. to 3in. long; upper ones linear or linear-lanceolate, mostly entire. *h.* 1½ft. to 2ft. 1844. An erect shrub or sub-shrub. (B. M. 4196.)

S. grandiflora (large-flowered). A synonym of *Leschenaultia linarioides*.

S. Kœnigii (Kœnig's).* Malay Rice Paper Plant. *fl.* pale red, in axillary cymes, much shorter than the leaves; calyx lobes

Scævola—*continued.*

as long as, or longer than, the tube; corolla ¾in. long, pubescent outside. August. *l.* obovate-oblong, 3in. to 5in. long, rounded and obtuse at top, entire or rarely broadly crenate, on short petioles. *h.* 2ft. 1820. An erect shrub. (B. M. 2732.)

S. microcarpa (small-fruited). *fl.* violet, in a usually long and interrupted spike; calyx lobes small; corolla hairy outside, seven to nine lines long. July. *fr.* small. *l.* petiolate, obovate, ovate, or cuneate, coarsely toothed, the lower ones often 1in. to 1½in. long, the upper ones passing into sessile floral leaves or bracts. 1790. An erect or diffuse perennial. (L. B. C. 1327; B. M. 287, under name of *Goodenia lævigata.*)

S. pilosa (pilose). *fl.* blue; calyx tube pubescent; corolla ¾in. to 1in. long; peduncles axillary, longer than the leaves, one-flowered. May. *l.*, lower ones petiolate, obovate or oblong, coarsely toothed, 2in. to 3in. long; upper ones much smaller, sessile and stem-clasping, varying from oblong-cuneate to lanceolate. *h.* 1ft. to 3ft. 1841. A hispid perennial or sub-shrub.

S. platyphylla (broad-leaved). *fl.* white, sessile or shortly pedicellate, in a terminal, leafy spike; calyx lobes very small; corolla above 1in. long, silky-hairy, the lobes winged. May. *l.* sessile and stem-clasping, ovate, obovate, or oblong, entire or few-toothed, 1in. to 1½in., or rarely 2in., long; upper floral ones gradually becoming smaller. *h.* 2ft. 1841. An erect, hispid plant, woody at base, with rigid, herbaceous branches.

S. Plumieri (Plumier's). *fl.* white, usually in axillary, peduncled cymes; calyx limb truncate-repand or obsoletely denticulate; corolla eight to ten lines long, villous within. August. *l.* fleshy, obovate, quite entire. *h.* 2ft. West Indies, 1724. Stove shrub.

S. suaveolens (sweet-smelling). *fl.* blue, sessile, in interrupted, terminal, hirsute spikes; calyx equally five-lobed; corolla seven to eight lines long, villous or glabrous outside, toothed or softly bristly in the throat. August. *l.* petiolate, from obovate to oblong-spathulate, quite entire, thick, the larger ones 2in. to 3in. long; upper ones smaller, or linear when on elongated branches. 1793. A prostrate or decumbent, hardy perennial or sub-shrub. (A. B. R. 22, under name of *Goodenia calendulacea.*)

SCALARIFORM. Ladder-shaped.

SCALE INSECTS (*Coccidæ*). These form one of the most destructive families among Insects. They belong to the class *Homoptera*, in which are also included the Frog-hoppers and the very numerous Aphides or Green-flies, both very hurtful to many plants. The Scale Insects have been studied by several entomologists, and of late years very important advances have been made in working out the life-histories of many species; but there are very wide gaps still to be filled before satisfactory results can be arrived at with regard to the transformations and life-histories of most of the species. Among those who have done most in this field for some time past are M. Signoret, in France, and Professor Comstock, in the United States of America. Our British species have been worked out, and the results have been published in the March and April numbers of the "Entomologists' Monthly Magazine" for 1886, by Mr. J. W. Douglas. He has succeeded in identifying a large number of species of these insects in our islands. Most of them are found on wild plants; but in greenhouses some

FIG. 441. LECANIUM HESPERIDUM (FEMALE)—*a*, Twig and Leaf-stalk of Orange, bearing Female Scale Insects, natural size; *b*, Female magnified.

species (see Fig. 441) infest many of the shrubs and other plants to such a degree that, by the continued suction of the sap, and the consequent tax on their strength, the

Scale Insects—*continued.*

plants are much weakened, and ultimately die. The females and larvæ are the hurtful members of the family; while the males, when fully developed, do no harm to plants. The females are by far the more numerous, and the more conspicuous; in fact, the males of even the commonest species are seldom seen, and those of a good many are still unknown. They are most successfully procured by collecting the larvæ and pupæ, which somewhat resemble scales, very early in spring, upon branches, which, with these scales on them, should be put into some secure vessel, *e.g.*, a glass jar.

The males are very unlike the females. They usually emerge early in the year, in the form of minute flies, with the head, thorax, and abdomen distinct and well formed—two delicate wings, six legs, and usually two

FIG. 442. LECANIUM PERSICÆ, showing (*a*) Leaf with Male on it, slightly enlarged; (*b*) Male Flying, much enlarged.

slender filaments at the hinder end of the body (see Fig. 442). They have no mouth, and therefore cannot take food in this state. They seldom live more than a few days, their sole function, as perfect insects, being to fertilise the females. In certain species, both wingless and winged males have been found.

Female Scale Insects are much larger than the males, and they alone fully deserve the name of Scale Insects. They are developed from larvæ of an oval form, which have three pairs of small legs (by the aid of which they can crawl about), small antennæ, and a beak with which to bore into leaves and young stems of plants, in order to suck up the sap. The larvæ are protected by a scale-like covering on the back. This scale is formed either by an excretion from the body (in *Coccinæ* and *Lecaninæ*), which increases in size as the larva grows, or also by the cast skins (in *Diaspinæ*). After the larvæ have fixed themselves in a suitable location on a plant, by pushing in the beak, they never leave the spot. As they increase in size, they undergo great alterations in structure, whereby the body becomes more rounded, and the beak becomes situated in the middle of the lower surface of the body. The legs and antennæ, and the rings of the body, almost or altogether disappear. The females thus at last lose all power of movement. After being fertilised by the winged males, or, in some species, without the action of the male being necessary, the females produce eggs, which are packed away below the scale-like bodies, and are thus protected by them, even after the death of the mothers. The females of some Scale Insects cover the eggs also with a white coat of felted threads. In certain species, the females are viviparous.

The number of species of Scale Insects already named is very large; but of many the males, as before observed, are still unknown. A large proportion live on the woody kinds of wild plants, fixed to the bark or to evergreen leaves, but many others select hardy cultivated plants; while others are confined, in this country, to greenhouse

Scale Insects—*continued.*

plants, to which they are often very destructive. Some broods consist wholly of females, and others of both sexes. Their rate of increase is much below that of the Aphides, there being, in most of the species, only one brood in the year.

The number of species already recorded as injurious to cultivated plants, especially in the warm zones, is too large to permit of more than a brief mention here of some of the more important kinds. They have been divided, by means of comparatively minute characters, into numerous genera; some of the species live upon several kinds of plants, and, on the other hand, many plants support various kinds of these insects. The latter are so much alike as to render it vain to attempt here to state clearly the differences between the species, as these are found in minute structural characters; nor, indeed, is this necessary, since the same remedies are serviceable against all of them, and are most successful when directed against the larvæ. In Great Britain, Scale Insects are far more numerous, and are usually more injurious, in glass houses than in the open air. But among the "outdoor" kinds the following must be noted: 1. Apple Mussel Scale, or Oyster-shell Bark Louse (*Aspidiotus conchiformis* or *Mytilaspis pomorum*), like single valves of very small mussel-shells adherent to the branches of Apple-trees; they occur on both sides of the Atlantic. 2. Pear Oyster Scale (*Diaspis ostreæformis*) very like the Apple Mussel Scale but of smaller size. 3. Rose Scale (*D. Rosæ*), like a white, scurfy coat on twigs and stems of Roses, especially of cultivated kinds. 4. Camellia Scale (*Aspidiotus Camelliæ*), on buds and bracts of Camellias. 5. Spindle-tree Scale (*Chionaspis Euonymi*), so abundant on *Euonymus japonicus*, near Montpellier, in France, as to threaten the existence of the shrub. Several species are found in Britain in greenhouses, where they frequently do very great harm. Among the more hurtful are: *Aspidiotus Nerii*, on Acacias, Lemons, Oleanders, &c.; *A. palmarum*, on Palms and Cycads; *Lecanium Hesperidum* (see Fig. 441), on Orange leaves, or on other food-plants (*e.g.*, *Myrtaceæ*); and *Dactylopius adonidum*, on most greenhouse plants.

Many others have been described as very hurtful, especially by Professor Comstock in his "Report on Scale Insects"; and probably a number of these will be found in English greenhouses, *e.g.*, *Dactylopius longifilis*, on Ferns and *Euphorbiaceæ*; *D. destructor*, on Coffee, Oranges, and, in fact, almost every greenhouse plant; *Ceroplastes floridensis*, on Oranges, &c.; but for a full account of these the reader is referred to the above-mentioned work.

Remedies are two-fold, viz., natural and artificial. The best natural remedy is to encourage the multiplication of certain minute insects belonging to the great division *Hymenoptera*, which are parasitic in the Scale Insects, and destroy large numbers of them. It has been found useful to carry branches bearing Scale Insects infested with parasites to localities where the parasites did not previously exist, inasmuch as they soon multiply, and produce a marked effect on the number of Scale Insects.

Artificial remedies are numerous. Among the most useful are the following: Soap solution (¼lb. of soap in one gallon of water) or kerosene solution (about one gill in five gallons of water), syringed or sprayed over the plants every second day; phenyle, in a strength of from three to six teaspoonfuls to four gallons of water, applied at intervals of eight days; alkaline washes, such as concentrated lye of wood-ashes or of coarse potash, which, used with a brush, frees the branches from the insects; strong solution of tobacco; and animal oils, *e.g.*, whale oil. The last-named suffocate the insects by closing the breathing pores along the sides of their body.

SCALE OR SCALY FERN. *See* **Asplenium Ceterach.**

SCALES. A term applied to close-pressed, small, rudimentary leaves, resembling minute scales, or to any thin, scarious bodies.

SCALIA. A synonym of **Podolepis** (which *see*).

SCALLION. A common name for *Allium ascalonicum majus*. The term is also generally applied to all Onions that do not bulb, but form long necks like Leeks.

SCALPELLIFORM. Resembling the blade of a penknife, but placed vertically on a branch.

SCAMMONY-PLANT. *See* **Convolvulus Scammonia.**

SCANDENT. Climbing.

SCAPE. A long, naked or nearly naked peduncle, rising from the crown of a root.

SCAPHYGLOTTIS (from *skaphe*, a boat, and *glotta*, a tongue; in allusion to the hollowed labellum). Boat-lip Orchid. SYN. *Cladobium*. ORD. *Orchideæ*. A small genus (about eight species) of stove, epiphytal, branched orchids, natives of tropical America. Flowers small, twin or few in a fascicle; lateral sepals prolonged at the base, and often connate with the foot of the rather long, erect column; petals similar but smaller; lip narrow, continuous with the column, but turned up so as to be parallel with it; pollen masses four, cohering in pairs. Leaves narrow, sometimes linear, coriaceous. Stems slender, straggling. Pseudo-bulbs borne in the axils of the leaves. Only two of the species are known to gardeners. These require similar culture to **Cattleya** (which *see*).

S. stellata (star-like). This species only differs from *S. violacea* in having larger flowers, with more spreading segments, and the lateral lobes of the lip as large as the middle one. Demerara.

S. violacea (violet). *fl.* violet, minute, borne on very short peduncles; lateral sepals produced, oblique, twice as broad as the upper one; lip white, fleshy, channelled. *l.* 2in. to 3in. long, linear or linear-lanceolate, emarginate. Stems terete, striated, articulated. Demerara. (B. M. 4071; B. R. 1901.)

SCAPIFORM, SCAPOSE. Resembling a scape.

SCAPIGEROUS. Scape-bearing.

SCAR. The mark left on a stem by the separation of a leaf; or on a seed, &c., by its detachment.

SCARCE UMBER MOTH. *See* **Hybernia.**

SCARIOLE. An old name for Endive (*Cichorium Endivia*).

SCARIOUS, SCARIOSE. Thin, dry, shrivelled, membranous; *e.g.*, the involucral leaves of many species of *Centaurea*.

SCARLET RUNNER. *See* **Beans** and **Phaseolus vulgaris multiflorus.**

SCARLET STRAWBERRY. *See* **Fragaria virginiana.**

SCATTERED. Not regularly disposed; *i.e.*, not whorled, opposite, or ternate, &c.

SCELOCHILUS (from *skelos*, a leg, and *cheilos*, a lip; in reference to the shape of the divided labellum). ORD. *Orchideæ*. A small genus (three or four species) of stove, epiphytal orchids, natives of the Andes of South America. Flowers mediocre, few in a raceme, pedicellate; sepals erect, connivent, the posterior one concave, the lateral ones connate, produced in a sac or spur; petals rather broader than the posterior sepal; lip continuous with the base of the column, long-clawed, erect; column erect, semi-terete; pollen masses two, sub-globose; bracts narrow; scapes at the base of the pseudo-bulbs, erect, simple or slightly branched. Leaf coriaceous, not plicate. Stem at length more or less thickened into a narrow

Scelochilus—*continued.*

pseudo-bulb. Only one species has been introduced. For culture, *see* **Burlingtonia.**

S. Ottonis (Otto's). *fl.* yellow, purple-striped within, short-stalked, compressed; spike a little branched, slightly longer than the leaf, round, thread-like, smooth, covered by sessile, dry, lanceolate, acuminate bracts. May. *l.* oblong, coriaceous, slightly undulated, conduplicate, and very acute at apex, recurved. Caraccas, 1841. (L. & P. F. G. iii. p. 87.)

SCENTED POLYPODY. *See* **Polypodium pustulatum.**

SCENTED VERBENA. *See* **Lippia citriodora.**

SCEPACEÆ. Included under *Euphorbiaceæ.*

SCEPASMA. Included under *Phyllanthus.*

SCEPTRANTHUS. Included under *Cooperia.*

SCHÆFFERIA (named in honour of James Christian Schæffer, 1718-1790, a German naturalist). ORD. *Celastrineæ.* A genus consisting of only two species of rigid, glabrous shrubs, natives of the West Indies, Texas, and New Mexico. Flowers greenish or white, small, in the axils of the leaves; calyx four-parted; petals four, hypogynous, oblong. Drupes the size of small peas. Leaves alternate or fascicled, small, coriaceous, entire, exstipulate, obovate or spathulate. Only one of the species has been introduced, and that possesses no particular beauty. It thrives in the stove, in a mixture of loam, peat, and sand. Half-ripened cuttings will root if inserted in sandy soil, under a hand glass, in heat.

S. frutescens (shrubby). Crabwood-tree; False Box. *fl.* white, on axillary, fascicled pedicels. August. *fr.* scarlet. *l.* elliptic, veiny, tapering at the base, 1½in. long. *h.* about 10ft. West Indies, 1793.

S. lateriflora (brick-flowered). A synonym of *Drypetes crocea.*

SCHAFFNERIA. Included under **Scolopendrium** (which *see*).

SCHAUERIA (named after John Konrad Schauer, 1813-1848, Professor at Greifswald). ORD. *Acanthaceæ.* A genus comprising about eight species of stove, glabrous or pubescent, erect herbs or sub-shrubs, natives of Brazil. Flowers often orange or red, disposed in terminal thyrses or spikes; calyx nearly five-parted, the segments linear or bristly; corolla tube slender, scarcely enlarged above, the limb bilabiate; stamens two; bracts and bracteoles linear or rarely lanceolate, rather long and coloured, or small. Leaves entire. The only species known in gardens are described below. For culture, *see* **Justicia** (under which these plants are often erroneously classified).

S. calycotricha (hairy-calyxed). *fl.*, calyx segments and bracts pale greenish or yellowish, minutely puberulous; corolla of a beautiful yellow, 1in. long, very softly pubescent; thyrse terminal, sub-spicate. February. *l.* broadly ovate, glabrous, with a very obtuse or sub-cordate base, slightly undulate-crenate. Branches slightly glabrous. *h.* 2ft. 1824. SYN. *Justicia calytricha* (H. E. F. 212).

S. flavicoma (yellow-haired). *fl.*, calyx ciliated, with numerous gland-tipped hairs. February. *l.* lanceolate, proportionately narrower, longer, and more acuminate, than those of *S. calycotricha*, acute or sub-acute at the base. (B. M. 2816, under name of *Justicia calycotricha*; B. R. 1027, under name of *J. flavicoma*; L. R. C. 1921 (?), under name of *J. callitricha.*)

SCHEDONORUS. The species of grasses formerly classed under this heading are now removed, by Bentham and Hooker, to *Bromus* and *Festuca.*

SCHEELEA (named in honour of Scheele, a celebrated German chemist). ORD. *Palmæ.* A genus consisting of about seven species of dwarf or tall, unarmed, stove palms, natives of tropical America. Flowers yellowish-white, dicecious, or on the same spadix monœcious; spathes two, the upper one fusiform, woody, acuminate; spadices long, very shortly pedunculate, with rather short, nearly erect branches. Fruit rather large, oblong or ovoid, one to three-seeded. Leaves terminal, pinnatisect; segments in series or aggregate, linear, in young plants obtuse and unequally bifid at apex, with incurved lobes (in

Scheelea—*continued.*

adults entire?), one-nerved, the margins recurved at base; rachis convex at back, acute above; petioles concave above; sheath short, opening. The under-mentioned species have been introduced to cultivation in this country. A compost of peat and loam, in about equal parts, with the addition of a little sand, is suited to their requirements. The plants may be increased by seeds. *S. unguis* is well adapted for room decoration, and, when older, for exhibition purposes.

S. excelsa (tall).* *fl.*, spathe costate; spadix simply and sparsely branched, 3ft. long, the branches 4in. to 6in. long; inflorescence axillary. *fr.* ovoid, apiculate. *l.* 15ft. to 24ft. long, elliptic, pinnatifid; leaflets linear, acute, glaucous beneath, about 180 on each side, aggregate in twos, threes, or fives, the upper ones solitary and alternate, 3ft. long, 2in. broad; petioles channelled. Trunk 40ft. to 50ft. high, glabrous, annulate, 2ft. to 3ft. in diameter, the wood reddish. Venezuela, 1826.

S. imperialis (imperial). *l.* pinnate when mature; in the young state simple, linear-lanceolate, elongated, arching, of a bright colour, and plaited. United States of Colombia, 1875. This is only known in the young state.

S. insignis (remarkable). *fl.*, spathe spongy-woody, thick, 2ft. long, terminated by a mucro 4in. to 6in. long; female spadix similar to the male, but more robust. *l.* 8ft. to 10ft. long; lower pinnæ aggregate in fours or fives; middle ones eight or more together; upper ones nearly solitary and opposite, linear-lanceolate, obtuse with a short acumen, not crisped, 1½ft. or more long. Trunk straight, 50ft. to 60ft. high. Quito, &c. SYN. *Maximiliana insignis.*

S. unguis (clawed).* *l.* erect, 2ft. to 6ft. or more in length; pinnæ about 1ft. long and 1in. broad, of a rich deep green, and reaching nearly to the base of the petiole; petioles sheathing at base, and clothed somewhat sparingly at the edges with brown fibres. A superb plant, described here as it appears in a young state, without any stem.

SCHEERIA. Included under *Achimenes.*

SCHELHAMMERA (named after G. C. Schelhammer, 1649-1716, professor at Jena). SYN. *Parduyna.* ORD. *Liliaceæ.* A small genus (two species) of greenhouse, perennial herbs, with fibrous roots and simple or branched stems, natives of Eastern Australia. Flowers terminal, pedicellate, solitary or umbellate, sessile within the last leaves; perianth of six distinct, deciduous segments, nearly equal and similar; stamens six, shorter than the segments. Leaves sessile, ovate or lanceolate, membranous. These pretty flowering plants succeed in a warm border, but the protection of a greenhouse is necessary during winter. A mixture of peat and loam is suitable for their culture. Propagation may be readily effected by division.

S. multiflora (many-flowered). *fl.* pure white, several in a terminal umbel, with sometimes a few bracts at the base of the pedicels besides the involucral leaves; pedicels ¾in. to 1in. long. June. *l.* 1in. to nearly 2in. long, firmer than in the other species, but not so broad at the base, the margins quite entire. Stems from a knotted rhizome, simple or branched, 6in. to nearly 12in. high. 1824. (L. B. C. 1511.)

S. multiflora (many-flowered), of Loddiges. A synonym of *Kreysigia multiflora.*

S. undulata (undulated). *fl.* pale lilac, solitary, or rarely two together at the ends of the branches; pedicels ½in. to 1in. long, without bracts. June. *l.* ovate-lanceolate, 1in. to nearly 2in. long, varying in breadth, the margins minutely undulated. Stems slender, diffuse and branching at base, ascending or erect, rarely above 6in. in height. 1824. (B. M. 2712.)

SCHELLOLEPIS. Included under *Polypodium.*

SCHELVERIA. A synonym of *Angelonia.*

SCHEUCHZERIA (named in honour of John and James Scheuchzer, Swiss botanists). ORD. *Naiadaceæ.* A monotypic genus. The species, *S. palustris*, is a curious, highly glabrous, Rush-like, marsh herb, with a six-parted perianth, and erect, slender leaves. It has no horticultural value, but is occasionally found wild in England and Scotland.

SCHIDOSPERMUM. A synonym of *Chlorophytum.*

SCHIMA (said to be the Arabic name). ORD. *Ternströmiaceæ.* A small genus (about four species) of stove trees or shrubs, inhabiting tropical Asia and the Indian Archipelago. Flowers showy, bibracteolate; sepals five,

Schima—*continued.*

scarcely unequal; petals five, much larger, connate at base, closely imbricated; stamens numerous; peduncles one-flowered, frequently erect, solitary in the axils, or the upper ones clustered in a short raceme. Leaves perennial. The only species introduced thrives in a peaty soil, and is propagated by cuttings inserted in sandy peat, in bottom heat.

S. Noronhæ (Noronha's). *fl.* white; sepals very concave; petals obovate, spreading; stamens very numerous; peduncles solitary, axillary, single-flowered, shorter than the leaves. August and September. *l.* alternate, elliptic-lanceolate, acuminated, entire, penninerved, tapering into a short petiole. Branches terete. A compact-growing shrub. Tropical Asia, 1849. (B. M. 4539, under name of *Gordonia javanica*.) SYN. *S. superba*.

S. superba (superb). A synonym of *S. Noronhæ*.

Schinus—*continued.*

sessile. "The leaves of some of the species are so filled with a resinous fluid that the least degree of unusual repletion of the tissue causes it to be discharged; thus, some of them fill the air with fragrance after rain; and *S. Molle* and some others expel their resin with such violence, when immersed in water, as to have the appearance of spontaneous motion, in consequence of the recoil" (B. R. 1580). The two species introduced require culture similar to that recommended for the stove species of **Rhus** (which *see*).

S. Molle (*Mulli*, the Peruvian name). Australian or Californian Pepper-tree; Peruvian Mastic-tree. *fl.* yellowish-green. July and August. *fr.* of a beautiful rose-colour, the size of peas. *l.* with numerous pairs of lanceolate, serrated leaflets, the terminal one longest. *h.* 20ft. Brazil and Peru, 1597. (B. M. 3339.)

FIG. 443. SCHISMATOGLOTTIS CRISPATA.

S. terebinthifolius (Terebinthus-leaved). *fl.* greenish-white, racemose. July. *l.* composed of seven somewhat serrated, almost equal leaflets. *h.* 20ft. Brazil, 1830.

SCHINUS (from *Schinos*, the old Greek name used by Theophrastus for the Mastic-tree, *Pistacia Lentiscus*; applied to this genus on account of the resinous, mastic-like juice which exudes from the species). ORD. *Anacardiaceæ*. A genus comprising twelve species of stove shrubs or small trees, inhabiting the warmer parts of South America. Flowers whitish, small, dicœcious; calyx short, with five imbricated lobes; petals five, imbricated; disk annular, rather broad; stamens ten; panicles axillary and terminal, bracteate. Drupes globose, oily. Leaves alternate, impari-pinnate; leaflets opposite or alternate,

SCHISMATOGLOTTIS (from *schisma, schismatos*, deciduous, and *glotta*, a tongue; the limb of the spathe soon falls off). SYN. *Zantedeschia*. ORD. *Aroideæ* (*Araceæ*). This genus includes about fifteen species of stove, stoloniferous herbs, natives of the Malayan Archipelago. Spathe cylindrical, the tube convolute, scarcely constricted at throat, the lamina apiculate or acuminate; spadix sessile, inappendiculate, included in the spathe,

Schismatoglottis—*continued.*

constricted at or below the middle; male inflorescence cylindrical or club-shaped; female shorter or narrower, cylindrical or conical; peduncles solitary or fascicled, shorter than the petioles. Leaves oblong- or ovate-cordate, rarely hastate or lanceolate, often marbled or spotted; petioles sheathing at base. Caudex short. The introduced species are described below. They require a moist atmosphere, and an abundance of water and shade. A well-drained compost of rich, sandy loam, fibry peat, and leaf mould, is most suitable. Propagation may be effected by division.

Schismatoglottis—*continued.*

bright green above; under surface and petioles vinous-purple. Java, 1882. (I. H. 468, under name of *S. L. Lansbergiana.*)

S. L. purpurea (purple).* *l.* bright green above, and blotched as in the type; under surface and petioles of a deep vinous-purple. Sumatra, 1882.

S. longispatha (long-spathed).* *fl.* curious in structure, the most conspicuous part being the small, yellowish-green spadices. *l.* obliquely ovate, about 4in. long, lightish green, marked with a feathered, central band of silvery-grey, through which runs the distinct green midrib; petioles as long as, or longer than, the blades. Stems short, erect, tufted, spreading by short rhizomes. Borneo, 1881. See Fig. 444, for which we are indebted to Mr. Wm. Bull. (I. H. 466.)

S. neoguineensis (New Guinea).* *fl.*, spathe pale greenish, with a narrowly ellipsoidal, obscurely trigonous tube 1in. long, and an acuminate limb 1½in. long; inflorescence solitary in the axils of the leaves; scapes 1½in. to 3in. long, inclosed in the sheaths of the petioles. *l.* ovate, acute, deeply cordate at the base; upper surface bright green, marked in a very irregular manner with large, pale yellowish-green blotches; petioles 9in. to 12in. long, terete, sheathing at the base. New Guinea, 1879. (I. H. 380, under name of *Colocasia neoguineensis.*)

FIG. 444. SCHISMATOGLOTTIS LONGISPATHA.

S. crispata (curled).* *fl.*, spathe green at the persistent, basal part, creamy-white and open in the upper, deciduous part; inflorescence sub-sessile. *l.* cordate-oblong, shortly cuspidate, dark green above, with a broad, irregular, greyish band on each side of the midrib, midway between it and the margin, or with greyish stripes running from the midrib between the veins; petioles with crisped, transparent edges. Borneo, 1881. See Fig. 443, for which we are indebted to Messrs. Veitch and Sons. (B. M. 6576.)

S. decora (comely). A synonym of *S. pulchra.*

S. latifolia (broad-leaved). A synonym of *S. rupestris.*

S. Lavallei (Lavalle's). *l.* bright green on the upper surface, variegated with irregular, greyish blotches, light green below. Borneo and Sumatra. (I. H. xxviii. 418.) Of this pretty, variegated Aroid, the following are two distinct varieties:

S. L. immaculata (unspotted). *l.* of a uniform, unspotted,

S. picta (painted). *fl.*, spathe tube obliquely ovoid-oblong, the lamina greenish-yellow, gaping, shortly cuspidate; male inflorescence of a pale sulphur colour. *l.* cordate-ovate, contracted into a cuspidate acumen, having a feathered, greyish band running down the middle; petioles as long as the blades. Java, 1864.

S. pulchra (pretty).* *l.* obliquely oblong, acute, cordate at base, 4in. to 5in. long, 1¾in. to 2½in. broad, of a peculiar glaucous-green

Schismatoglottis—*continued.*

above, covered with irregular, silvery-green spots. Borneo, 1884. A charming little foliage plant. (I. H. 520.) SYN. *S. decora.*

S. rupestris (rock-loving). *fl.*, spathe yellow, the tube oblong-ovoid, the lamina scarcely opening; peduncles many. *l.* ovate, acute, deeply cordate, the lobes semi-ovate; petioles longer than the blades, sheathing about one-third their length, slightly terete above. Caudex thick. Java, 1882. SYN. *S. latifolia.*

S. siamensis (Siam). *l.* ovate, acuminate, glossy-green, spotted with white. This plant, from its comparatively small size and neat habit, is very useful for decorative purposes. Siam, 1884.

S. variegata (variegated).* *fl.*, spathe having a glaucous-green tube, and a pale yellowish-green, boat-shaped lamina; peduncles short, but longer than the spathe. *l.* oblong-lanceolate, obtuse or scarcely rounded at base, narrowed and long-cuspidate at apex, dark green, with a broad, silvery, central band beneath; petioles half the length of the blades, rather broadly sheathing at base. Borneo 1862. Plant stemless.

SCHISMUS (from *schisma*, a cleft; alluding to the divided outer palea). SYNS. *Electra*, *Hemisacris*. ORD. *Gramineæ*. A small genus (three or four species) of tufted, annual, usually dwarf, hardy grasses, inhabiting the Mediterranean region. Flowers in a narrow, dense or rather loose panicle, with erect branchlets. Leaves narrow, sometimes bristly. *S. marginatus* has been introduced, but it has no horticultural interest.

SCHISTACEOUS. Slate-grey.

SCHIVERECKIA. Included under *Alyssum.*

SCHIZÆA (from *schizo*, to split; in allusion to the fan-shaped or dichotomously-multifid fronds). Comb or Rush Fern. Including *Actinostachys* and *Lophidium.* ORD. *Filices.* A genus comprising about sixteen species of ornamental, stove, greenhouse, or hardy ferns, widely diffused. Capsules sessile, two-valved, in two to four rows, covering one side of close, distichous spikes, which form separate fertile segments at the tips of the fronds. The introduced species are described below; they are rather difficult subjects to grow. A compost of rough peat and loam, ample drainage, and an abundance of water, are necessary. For general culture, *see* **Ferns.**

S. bifida (twice-cleft).* *sti.* dense, chestnut-brown, passing gradually into the fronds, which are 6in. to 18in. long, forked generally below the middle, sometimes forked again, casually simple, very wiry and Rush-like, with a prominent, scabrous midrib and two narrow, thick wings; fertile segments sub-erect or recurved, unilateral, ½in. to ¾in. long, with ten to twenty erecto-patent spikes on each side. Australia, &c., 1822. Greenhouse.

S. dichotoma (dichotomous). *sti.* 6in. to 18in. long, firm, erect, channelled on the face above. *fronds* fan-like, 6in. to 9in. each way, many times dichotomously forked, the ultimate divisions with one fertile segment to each; rachis with four to ten close-spreading spikes on each side. West Indies, &c. Stove.

S. digitata (digitate). *sti.* dense, 1in. to 2in. long, brownish, sub-terete, passing gradually into the fronds, which are 1ft. or more long, one to two lines broad, flattened, the midrib beneath prominent, crowned at the apex with six to fifteen sub-triquetrous, fertile spikes which are 1½in. long. Malay Isles, &c. Stove. (H. G. F. 54.)

S. elegans (elegant). *sti.* 6in. to 12in. long, firm, erect, naked. *fronds* V-shaped, 4in. to 8in. each way, dichotomously forked or cleft, the divisions varying greatly in number and breadth (¼in. to 2in.); fertile segments copious, distinctly stalked, ¼in. to ⅜in. long, the rachis often recurved, with six to fifteen close-spreading, linear-cylindrical spikes on each side. West Indies, &c., 1819. Stove. (H. G. F. 34.) *latifolia* is a form with broad fronds.

S. penicillata (pencil-like). A synonym of *S. pennula.*

S. pennula (small-winged). *sti.* dense, 1in. to 2in. long, brownish, passing gradually into the fronds, which are 1ft. or more long, nearly one line thick, triquetrous, with three sharp angles, crowned at the apex with six to twelve sub-triquetrous, fertile spikes, which are ½in. to 1½in. long, pilose beneath, with the capsules usually in four rows. South America, 1816. Stove. SYN. *S. penicillata.*

S. pusilla (dwarf). *sti.* dense. *barren fronds* much shorter than the fertile ones, much twisted and slightly flattened. *fertile fronds* 3in. to 4in. long, terete, wiry, very slender; fertile segments sub-erect, ¼in. long, unilateral, with about six rather stout, erecto-patent spikes on each side, the lowest ⅛in. long. United States. Hardy in the South of England.

S. rupestris (rock-loving).* *sti.* lax, about 1in. long, sub-terete, passing gradually into the fronds, which are grass-like and flattened, 3in. to 4in. long, one line broad, with a slender midrib; fertile segments pinnate, solitary, sub-erect, ⅛in. to ¼in. long, with six to ten slender, spreading, serrated spikes on each side. Australia, 1822. Greenhouse. (H. G. F. 42.)

SCHIZANDRA (from *schizo*, to cleave, and *aner*, *andros*, a male; the stamens are split). Including *Maximowiczia* and *Sphærostema.* TRIBE *Schizandreæ* of ORD. *Magnoliaceæ.* A genus comprising six species of ornamental, stove, greenhouse, or hardy, sarmentose shrubs; one is a native of North America, and the rest are found in tropical or Eastern Asia. Flowers red, yellowish, or whitish, unisexual; sepals and petals nine to twelve, passing gradually the one into the other; stamens of the males five to fifteen, more or less united in a globe or ring; carpels of the females numerous; peduncles solitary, one-flowered. Leaves membranous, pellucid-dotted, exstipulate. The under-mentioned species are those best known in gardens; they thrive in a mixture of sandy loam and peat. Ripened cuttings will root readily if inserted in sand, under a glass.

S. chinensis (Chinese). *fl.* pale rose. Summer. *fr.* scarlet, persistent during a great part of the winter. *l.* simple. *h.* 20ft. Northern China, 1860. A handsome, hardy, climbing shrub.

FIG. 445. PORTION OF FLOWERING BRANCH OF SCHIZANDRA COCCINEA.

S. coccinea (scarlet). *fl.* crimson, small, on long peduncles; stamens five; uppermost flowers mostly staminate. May and June. *l.* alternate, oblong, acuminate, long-petioled, 3in. to 4in. long, often somewhat toothed. Stem climbing high. North America, 1806. Greenhouse. See Fig. 445. (B. M. 1413.)

S. marmorata (marbled). *l.* of a bold character, acuminately heart-shaped, beautifully marked with silvery, fleece like spots or clouds on the green surface. Borneo, 1860. A fine, stove climber. SYN. *Sphærostema marmoratum.*

S. propinqua (related). *fl.* pale yellow, at length orange, solitary or twin, drooping a little. July. *l.* ovate-lanceolate, rounded or cuneate at base, long-acuminated at apex. *h.* 6ft. Nepaul, 1828. Stove. (B. M. 4614, under name of *Sphærostema propinquum.*)

SCHIZANDREÆ. A tribe of *Magnoliaceæ.*

SCHIZANTHES. Included under *Narcissus.*

SCHIZANTHUS (from *schizo*, to cut, and *anthos*, a flower; alluding to the incised corolla). Butterfly or Fringe Flower. ORD. *Solanaceæ*. A small genus (about seven species have been described) of very beautiful and showy, erect, more or less glandular-viscous, half-hardy, annual herbs, restricted to Chili. Flowers variously coloured; calyx deeply five-cleft; corolla tube short or elongated, cylindrical; limb spreading, oblique, plaited, sub-bilabiate, imbricated, elegantly incised; perfect stamens two; cymes terminal. Leaves often pinnatisect, the segments entire or toothed. The species and varieties of *Schizanthus* form very elegant, free-flowering, border plants, in summer and autumn, outside. The half-hardy kinds may be sown in a little heat, in spring, and afterwards planted out; or in autumn, and preserved in a cool house or pit through the winter. *S. pinnatus* and its garden varieties are hardy, and will grow and flower freely if sown in the open ground, in March or April. These plants are well adapted for pot-culture to flower in early spring; for this purpose, seeds should be sown in August or September, and the young plants grown on singly in a frame or house where frost is merely excluded. They may be grown to flower in 7in. or 8in. pots, during early spring, when the plants become, in a greenhouse temperature, a mass of elegant foliage and curiously-shaped blossoms. Seeds ripen in great abundance. A rich soil is advisable for pot-culture, after the plants are strong enough to bear it; in the open ground, also, they well repay liberal treatment. The best-known species are here described.

S. candidus (white).* *fl.*, corolla white; anterior lip segments laterally bilobed, the lobes shortly and irregularly incised. July. *l.* pinnatisect or deeply pinnatifid; segments entire, few-toothed. *h.* 2ft. 1843. Allied to *S. Hookeri*. (B. R. 1843, 45.)

S. Evansianus (Evans'). A synonym of *S. pinnatus*.

FIG. 446. FLOWERING BRANCH AND DETACHED FLOWER OF SCHIZANTHUS GRAHAMI.

S. Grahami (Graham's).* *fl.* ample; corolla lilac or rose-colour; upper lip yellow, tipped with lilac; tube equalling the calyx. June to October. *l.* once or twice pinnatisect; segments entire or dentate-pinnatifid. *h.* 2ft. 1831. See Fig. 446. (B. M. 3044; F. d. S. 712; B. G. 385.)

S. G. retusus (retuse).* *fl.* much larger than in the type; corolla intense rose-colour; middle segment of the anterior lip orange near the apex. *l.* less dissected. (B. M. 3045, B. R. 1544, and

Schizanthus—*continued.*

S. B. F. G. ser. ii. 201, under name of *S. retusus*.) A sub-variety has white flowers with crimson tips.

S. Hookeri (Hooker's). *fl.*, corolla pale rose-colour, except the middle of the upper segment, which is yellow; middle segment of the lower lip furnished with two long horns; stamens long-exserted. *l.* similar to those of *S. Grahami*. *h.* 2ft. 1828. (B. M. 3070.)

S. pinnatifidus (pinnatifid-leaved). A synonym of *S. pinnatus*

S. pinnatus (pinnate-leaved).* *fl.*, corolla tube shorter than the calyx; posterior lip often violet or lilac, the middle segment cucullate, bilobed; anterior lip pale, the middle segment more or less yellowish, and spotted with purple or violet, emarginate, the lateral ones four-lobed. June to October. *l.* once or twice pinnatifid; segments entire, toothed, or incised-pinnatifid. *h.* 2ft. 1822. The following figures represent different forms of this variable plant: B. M. 2404; B. R. 725, 1562; H. E. F. 73; P. M. B. ii. 198; S. B. F. G. 63, and ser. ii. 97. SYNS. *S. Evansianus* (L. & P. F. G. viii. 171), *S. pinnatifidus*, *S. porrigens* (B. M. 2521; H. E. F. 86; S. B. F. G. 76). *S. Priestii* (L. & P. F. G. i. 31) is a white-flowered form.

S. porrigens (spreading). A synonym of *S. pinnatus*.

S. Priestii (Priest's). A form of *S. pinnatus*.

S. retusus (retuse). A synonym of *S. Grahami retusus*.

SCHIZOBASIS (from *schizo*, to cut, and *basis*, the base; the withered perianth separates at its base from the receptacle, and is pushed off by the swelling fruit in the form of a calyptra). ORD. *Liliaceæ*. A genus consisting of five species of stove or greenhouse, bulbous plants, natives of tropical and South Africa. Flowers small, racemose or scattered at the sides of the branches; perianth marcescent, persistent, with equal, spreading segments; stamens six; bracts minute or obsolete. Leaves radical, early, few, linear, rather thick, absent in flowering specimens. Stem leafless, slender, branched. *S. intricata*, the only species introduced, requires greenhouse heat, and full sunshine. It thrives in light loam, and may be increased by seeds, or by offsets.

S. intricata (intricate). *fl.*, perianth white, with a green dorsal rib; racemes ultimately very loose, 1½in. to 2in. long; panicle obversely deltoid, 2in. to 6in. long and broad, the branches ascending; scape firm, slender, 2in. to 6in. long. *l.* four to ten, subulate, erect, fleshy, glabrous, 2in. to 3in. long. South Africa, 1875.

SCHIZOCÆNA SINUATA. A synonym of *Cyathea sinuata*.

SCHIZOCARP. A pericarp which splits into one-seeded pieces.

SCHIZOCENTRON. A synonym of **Heeria** (which *see*).

SCHIZODIUM (from *schizo*, to cut; alluding to the cleft column). ORD. *Orchideæ*. A genus comprising ten species of slender, terrestrial, greenhouse orchids, with undivided tubers, natives of South Africa. Upper sepal erect, concave or galeate, the base produced in a spur, the lateral ones free and spreading; petals erect or spreading; lip spreading from the base of the column, free, contracted above into a claw, not spurred, the blade undivided; column very short, bipartite. Leaves sub-radical, usually small. None of the species are at present in cultivation.

SCHIZOLOBIUM (from *schizo*, to split, and *lobos*, a pod; probably alluding to the dehiscence of the pod). ORD. *Leguminosæ*. A genus comprising two (?) species of tall, stove, evergreen trees, one from Brazil, and the other (perhaps a variety) a native of Panama. Flowers racemose; calyx segments imbricated, reflexed; petals five, unguiculate, ovate or rounded; stamens ten, free; racemes axillary or paniculate at the tips of the branches; bracts small. Pods one-seeded. Leaves bipinnate, ample; leaflets numerous, small. *S. excelsum* has been introduced, and requires culture similar to that recommended for **Cæsalpinia.**

S. excelsum (lofty). *fl.* yellow; peduncles glabrous; pedicels adpressedly pilose. *l.* eighteen-jugate; leaflets 2in. long, about twenty-jugate, oblong, very shortly petiolulate, white beneath, and golden-pilose on the middle nerve; common petiole often 2ft. long, glabrous. *h.* (in Brazil) 120ft. 1874.

SCHIZOLOMA. Included under **Lindsaya** (which *see*).

SCHIZOMERIA (from *schizo*, to cut, and *meris*, a part; alluding to the cut petals). ORD. *Saxifrageæ*. A monotypic genus. The species is an ornamental, greenhouse, evergreen tree, thriving in a mixture of loam and sandy peat. Propagated by cuttings.

S. ovata (ovate-leaved). *fl.* white, small, in terminal, trichotomous cymes; calyx five-lobed, with a short tube; petals five, toothed. June. *fr.* a rather large, ovoid or globular drupe. *l.* ovate or ovate-lanceolate, obtuse or acuminate, mostly 3in. to 4in. long, nearly entire, or with irregular, obtuse serratures. *h.* (in its native place) 50ft. Australia, 1825.

SCHIZONEURA LANUGINOSA. *See* **American Blight, or Woolly Aphis.**

SCHIZOPETALON (from *schizo*, to cut, and *petalon*, a petal; alluding to the cut or divided petals). ORD. *Cruciferæ*. A genus comprising five species of erect, slightly-branched, half-hardy, annual herbs, natives of Chili. Flowers purple or white, in terminal, leafy-bracted racemes; sepals erect, sub-equal at base; petals unguiculate, pinnately lobed, involute in æstivation. Leaves alternate, sinuate-toothed or pinnatifid. *S. Walkeri*, the only species introduced, is a singular plant, thriving in a compost of loam, peat, and sand. Specimens should be raised in pots, in a greenhouse, during spring; some of them may then be planted out in the borders; others may be kept in pots, and placed in an airy part of the greenhouse, where they will produce seeds, although sparingly. When transplanting, care must be taken not to injure the roots.

S. Walkeri (Walker's).* *fl.* white, in long racemes; pedicels each furnished with a linear bract. May to August. *l.* alternate, sinuately pinnatifid. *h.* 1ft. to 2ft. 1821. Whole plant beset with branched down. (B. M. 2379; B. R. 752; H. E. F. 74; S. B. F. G. ser. ii. 387.)

SCHIZOPHRAGMA (from *schizo*, to cut, and *phragma*, an inclosure or wall; the portions of the wall between the ribs of the fruit fall away when it is ripe). ORD. *Saxifrageæ*. A monotypic genus. The species is a hardy shrub, allied to *Hydrangea*, which it much resembles in its flowers. It will thrive in any garden soil, but succeeds best when planted against a wall. Propagation may be effected by cuttings, inserted in sand, under a bell glass, in slight bottom heat; or by seeds.

S. hydrangeoides (Hydrangea-like). Climbing Hydrangea. *fl.* white or flesh-coloured; calyx tube turbinate, the limb five-toothed; petals five, valvate; cyme corymbose, nearly flat at top, terminal, upwards of 6in. in diameter. Autumn. *l.* deciduous, opposite, often reddish, 2in. to 4in. long, ovate-cordate, deeply toothed, long-acuminate, long and slenderly petiolate. A tall climber. Japan, 1879. (R. H. 1881, p. 313; S. Z. F. J. 26.)

SCHIZOPLEURA. Included under *Beaufortia*.

SCHIZOPTERIS. Included under *Cheilanthes*.

SCHIZOSTEMMA. A synonym of **Oxypetalum** (which *see*).

SCHIZOSTYLIS (from *schizo*, to cut, and *stylos*, a style; the style is divided into three long, filiform branches). ORD. *Irideæ*. A genus consisting of a couple of species of greenhouse or half-hardy, South African plants. Flowers sessile in a spathe; perianth red, showy, the tube slender, very shortly enlarged at the throat, the lobes equal, oblong or ovate, spreading; stamens affixed to the throat; spathes scattered at the sides of a simple peduncle. Leaves linear or narrow-ensiform. Stems fascicled on a rhizome, ebulbous or slightly bulbous-thickened at base. *S. coccinea*, the only species introduced, is a very handsome inhabitant of our gardens. It grows freely in a warm, sunny border, such as may often be found in front of a glass structure. The shoots are produced in abundance, and the flowers, which appear in autumn, retain their beauty for a considerable period. The plant is also well adapted for pot-culture, as the

Schizostylis—*continued*.

flowers come to perfection, under such treatment, in a greenhouse, and are very useful for cutting. Propagation may be readily effected, in spring, by dividing the plants, and inserting pieces, consisting of from four to six shoots, in prepared soil, about 9in. apart. Sandy loam and peat, or leaf soil, forms a good compost.

S. coccinea (scarlet).* Crimson Flag; Kaffir Lily. *fl.* ten to fourteen in a distichous spike; perianth tube shorter than the bracts; limb 2in. across, of six spreading, uniform, ovate-oblong, very acute lobes; anthers yellow. October and November. *l.* long, sheathing, sword-shaped, carinate, the longest arising from the base; upwards they gradually form bracts. *h.* 3ft. 1864. Half-hardy. (B. M. 5422; F. d. S. 1637; F. M. 183; I. H. 394.)

SCHKUHRIA (named after Christian Schkuhr, 1741-1811, of the University of Wurtemburg, who published some botanical works). SYNS. *Mieria*, *Tetracarpum*. Including *Achyropappus* and *Chamæstephanium*. ORD. *Compositæ*. A genus comprising about eight species of annual herbs, natives of South and Central America as far as Mexico. Flower-heads yellow, small, long-stalked. Leaves slender, dissected. The species have no horticultural value.

SCHLIMMIA (named in compliment to M. Schlim, one of M. Linden's plant-collectors). ORD. *Orchideæ*. Three species have been referred to this genus; they are closely-related, stove, epiphytal orchids, natives of the Columbian Andes. Flowers rather large, fleshy, few in a raceme, shortly pedicellate; posterior sepal free, concave-carinate; lateral ones very broad, connate with the foot of the erect column; petals narrower, spreading at apex; lip variously lobed, the apex reclining on the foot of the column; pollen masses two; bracts oblong; scapes erect or recurved, simple, few-sheathed. Leaf coriaceous, contracted into the petiole. Pseudo-bulbs oblong, somewhat fusiform, one-leaved. Two of the species have been introduced. They should be grown in a pot with good drainage, and placed in the Cattleya house.

S. jasminodora (Jasmine-scented). *fl.* white and very fragrant; dorsal sepal linear, erect; petals reflexed; lip fleshy, shorter than the column, and articulated with it, with three knobs near the foot of the column, another in the middle of its length, and a fifth, which is concave, at its extremity, which is prolonged into a thin, trowel-shaped limb; scape 1ft. high, bearing three secund flowers. *l.* oval, long-stalked. Pseudo-bulbs long and slender. New Grenada, 1852. (L. & P. F. G. iii. *p.* 115.)

S. trifida (three-cleft). *fl.* having a delicious perfume, between those of Jasmine and Bergamot; dorsal sepal turned downwards; lateral ones waxy-white, with a few purple spots inside; petals linear, acute, bent outwards; lip having a panduriate hypochil, trifid at apex, white, marked with rich orange; peduncle lateral, drooping, deep purple, bearing a one-sided raceme of about four flowers. *l.* oblong, acute. Pseudo-bulbs elongate-ovate, clustered. New Grenada, 1877. (G. C. n. s., vii. 141.)

SCHLUMBERGERIA (named in honour of F. Schlumberger, a Belgian horticulturist). *Anoplophytum* has been used as a generic name for one or more of the species. ORD. *Bromeliaceæ*. A rather doubtful, South American genus, comprising two or three species of stove, perennial herbs. Flowers mediocre or rather large, disposed in rather loosely-branched spikes; sepals erect, convolute-imbricated, free; petals connate in a tube, the limb free, spreading or at length reflexed; stamens adnate to the tube; bracts shorter than the calyx. Leaves rosulate, entire, long-ligulate. The species require culture similar to **Tillandsia** (which *see*).

S. Lindeni (Linden's). This is the correct name of the plant described in this work as *Massangea Lindeni*.

S. Morreniana (Morren's). *fl.* yellow; bracts dark purple; spikes several, dense-flowered, congested into a short, compact bunch; scape tall, with green, adpressed bracts. *l.* gracefully recurving, 3ft. long, green, marked with numerous darker green, transverse lines above, and with reddish lines beneath. Habitat unknown. 1883. A noble plant. (B. H. 1883, 4-6.)

S. Roezlii (Roezl's). *fl.* sessile, spirally arranged, 1in. long; calyx green; corolla white and green, salver-shaped. *l.* 1½ft. long, 1½in. wide, spreading, unarmed, green. *h.* 3ft. Andes of Peru, 1879. A plant of bold habit. (B. H. 1879, 19.)

SCHMIDELIA (named after C. C. Schmidel, 1718-1792, Professor of Botany at Erlangen). SYNS. *Allophyllus*, *Aporetica*, *Ornitrophe*. ORD. *Sapindaceæ*. A large genus (about eighty species) of stove, erect or sub-erect shrubs or small trees, mostly tropical American; several are found in tropical and South Africa, tropical Asia, the Pacific Islands, and Australia. Flowers small or minute, globose, in simple or loosely-panicled, axillary racemes; sepals and petals four, the latter rarely absent. Leaves alternate, exstipulate, one to three (rarely five) foliolate; leaflets usually ample, entire or serrated, membranous, often dotted or lined. A few of the species have been introduced, but they are probably lost to cultivation.

SCHŒNIA (named in honour of Dr. Schœn, a botanist). ORD. *Compositæ*. A monotypic genus, differing from *Helichrysum* chiefly in the flat achenes of the circumference. The species is an erect, corymbosely-branched, scabrous-pubescent or more or less cottony-woolly, greenhouse annual. It requires culture similar to that recommended for **Helichrysum**.

S. Cassiniana (Cassini's). *fl.-heads* yellow, disposed in a loose, terminal corymb; outer involucral bracts usually brown, the radiating laminæ of the inner bracts white or pink. April. *l.* lanceolate or linear, or the lower ones oblong-spathulate, the longest above 2in., the upper ones few and small. *h.* 1ft. to 2ft. Australia, 1845. (L. J. F. 149; B. M. 4650 and F. d. S. 630, under name of *S. oppositifolia*.)

SCHŒNOPRASUM. Included under *Allium*.

SCHŒNORCHIS (from *schoinos*, a rush, and *Orchis*; in reference to the Rush-like leaves). ORD. *Orchideæ*. A monotypic genus. The species — a stove, epiphytal orchid, with rather small, racemose flowers, linear-terete, sub-distichous leaves, and elongated, leafy stems—has not yet been introduced to cultivation. It is a native of Java.

SCHŒNUS (from *Schoinos*, an old Greek name for a Rush or Sedge as far back as Homer). Including *Chætospora*. ORD. *Cyperaceæ*. A genus comprising about sixty species of stove, greenhouse, or hardy, usually perennial, Rush-like herbs, chiefly inhabiting temperate regions. Spikelets few-flowered, often fascicled; fascicles forming a dense, terminal head, or variously apicate or paniculate. *S. ferrugineus* and *S. nigricans* are British plants. Several exotic species have been introduced, but they possess no interest from a garden standpoint.

SCHŒPFIA (named in honour of John Schœpf, a German botanist). SYNS. *Codonium*, *Hænkea*. ORD. *Olacineæ*. A genus comprising about ten species of stove or greenhouse, glabrous shrubs or small trees, natives of tropical Asia and America. Flowers pale yellow or white, often comparatively large, disposed in short, sometimes very short, axillary, solitary or fasciculate racemes; calyx small, cyathiform; disk hypogynous, adnate with the ovary; petals four to six, coalescing in a tubular-campanulate corolla. Leaves entire, coriaceous. *S. fragrans*, the only species introduced, thrives in a compost of peat, loam, and sand. Rooted cuttings should be inserted in sand, under a hand glass, in heat.

S. fragrans (fragrant). *fl.* yellow, fragrant, ¼in. in diameter; racemes half the length of the leaves; rachis slender; pedicels six to eight, ½in. to 1in. long. June. *l.* narrow-lanceolate, acuminate, scattered, 2in. to 3in. long, acute at both ends; petioles ¼in. long, channelled above. Branches terete, smooth. *h.* 15ft. Nepaul, 1827.

SCHOLLERA. A synonym of **Oxycoccus** (which *see*).

SCHOLLIA. A synonym of **Hoya** (which *see*).

SCHOMBURGKIA (named after Sir R. Schomburgk, 1804-1865, a traveller in Guiana, and other parts of South America). ORD. *Orchideæ*. About a dozen species have been referred to this genus; they are stove, epiphytal, pseudo-bulbous or caulescent orchids, natives of tropical America. Flowers showy, pedicellate; sepals

Schomburgkia—*continued.*

and petals free, spreading, undulated; lip erect, shortly connate with the base of the straight or incurved column, the middle lobe rounded or broadly two-lobed and flat, or narrower and undulated, the side lobes loosely infolding the column; pollen masses eight; bracts persistent; raceme borne on an elongated peduncle. Leaves ovate, oblong, or elongated, thickly coriaceous or rigidly fleshy. The most desirable species are described below. "They succeed in the Cattleya house on blocks, or in baskets suspended from the roof, in moss, or moss and peat mixed together; or they may be grown in pots equally well, if that system is preferred. A liberal supply of water is necessary during the growing season; but after they have completed their growth, water should be withheld until they begin to show flower. Propagation is effected by parting the stems" (B. S. Williams).

S. crispa (curled). *fl.*, sepals and petals brown, oblong, having a yellow, undulated margin; lip white, ovate-oblong, obtuse, obscurely three-lobed; raceme broad, crowded; peduncle arising from the base of the upper leaf, 3ft. to 4ft. long. Winter. *l.* two or three at the tip of the stem, oblong-lanceolate. Stems fusiform, 1ft. high. Demerara, 1844. This species does best in a pot or basket; the flowers are sometimes wholly of a dull brick-red. (B. R. 1844, 23; L. S. O. 10.)

S. grandiflora (large-flowered). A synonym of *S. tibicinis grandiflora*.

S. Lyonsi (Lyons'). *fl.* on long pedicels; sepals and petals white, spotted and transversely barred with purple, ovate, obtuse, crispy; lip white, yellow-edged, scarcely spotted, acute; raceme broad, many-flowered; scape 3ft. to 4ft. long. August. *l.* like those of *S. crispa*. Stems about 1ft. high. Jamaica, 1853. This species, which has been called "the prettiest of the genus." succeeds either in a basket or on a block. (B. M. 5172; F. d. S. 2130.)

S. marginata (margined). *fl.*, sepals and petals dull brick-red, oblong, spreading, remarkably crisped or undulated; lip nearly white, tinged with pink, yellow at base, oblong-ovate, less waved than the sepals; stalk 1ft. to 1½ft. high, bearing a broad raceme or corymb. *l.* two or three to a pseudo-bulb, large, oblong-lanceolate, coriaceous. Pseudo-bulbs oblong, furrowed, stipitate, and sheathed with pale brown scales. Surinam, 1838. (B. M. 3729; L. S. O. 13.)

S. tibicinis (cow-horn). Cow-horn Orchid. *fl.* 2in. to 3in. across, many, in a terminal panicle; sepals and petals pale mauve-purple, flushed with crimson, oblong, obtuse, wavy; lip white, rose-coloured on the large, erect side lobes; scape 5ft. or more long. May and June. *l.* two or three, oblong, spreading. Stems conical in outline, horn-shaped, annulate, furrowed, 1½ft. long, hollow, of ample size. Honduras, 1834. A truly noble plant, succeeding best on a block, with plenty of heat and moisture. (W. O. A. 205.) SYN. *Epidendrum tibicinis*.

S. t. grandiflora (large-flowered).* *fl.* more handsomely coloured and larger than in the type; sepals and petals rather pale purple, deeper and redder inside, especially towards the ends; side lobes of the lip purplish towards the edges outside, orange streaked with purple within, the disk white, the front lobe white stained with yellow, and bordered with purple. 1844. SYN. *S. grandiflora* (B. M. 4476; B. R. 1845, 30; F. d. S. 49).

S. undulata (waved).* *fl.* densely racemose; sepals and petals rich brownish-purple, rounded and crisped, longer than the lip; lip clear violet-purple, cucullate, the middle lobe oval, acute or obtuse, the lateral ones rounded; bracts very long, spathe-like. January. Pseudo-bulbs fusiform. La Guayra, New Grenada, 1843. (W. S. O. ser. ii. 21; B. R. xxxi. 53, under name of *Bletia undulata*.)

SCHOTIA (named in honour of Richard Van der Schot, a travelling companion and friend of Jacquin; he died in 1819). Kaffir Bean-tree. ORD. *Leguminosæ*. A genus comprising four species of greenhouse, unarmed shrubs or small trees, confined to Southern and sub-tropical Africa. Flowers crimson, pink, or flesh-coloured, showy, panicled; calyx segments four, closely imbricated; petals five, nearly equal, sub-sessile, imbricated; stamens ten, free or very shortly connate at base; bracts and bracteoles ovate or oblong, highly caducous. Pods oblong or broadly linear, often falcate, flat-compressed. Leaves abruptly pinnate; leaflets coriaceous or small; stipules short. The species, the best-known of which are described below, are very handsome subjects when in flower. They require similar treatment to **Schmidelia** (which *see*).

S. latifolia (broad-leaved). Elephant Hedge Bean-tree. *fl.* rose or flesh-colour, sub-sessile, in excessively branched, axillary and

Schotia—*continued.*

terminal panicles; petals longer than the calyx. June. *fr.*, pods 1½in. to 4in. long, edible when roasted. *l.* two to four-jugate; leaflets variable in shape, 1½in. to 2in. long, ½in. to 1in. broad, rigid and thick. *h.* 20ft. to 30ft. 1815. Tree. (H. E. F. 159.)

S. speciosa (showy). *fl.* crimson, pedicellate; petals much longer than the calyx; panicles terminal, fasciculate-corymbose, many-flowered. Summer. *l.* polymorphous, four to sixteen-jugate; leaflets variable in shape, pubescent or glabrous. *h.* 8ft. to 12ft. 1759. A large shrub or small tree.

S. tamarindifolia (Tamarind-leaved). *l.*, leaflets eight to ten pairs, linear-oblong, oblong, or elliptic, mucronate or obtuse, unequal, sub-truncate or rounded at base, four to five lines long. 1795. (B. M. 1153; A. B. R. 348, under name of *S. speciosa*.)

SCHOUSBŒA. A synonym of *Cacoucia*.

SCHOUWIA (named in honour of J. F. Schouw, 1787-1854, a celebrated Danish botanist). ORD. *Cruciferæ*. A genus consisting of three species of tall, branched, highly glabrous, hardy herbs, natives of Arabia. Flowers purple, at first corymbose, afterwards racemose, slenderly pedicellate; sepals sub-erect, the lateral ones broader; stamens free. Leaves entire. *S. arabica* is a pretty annual; it only requires sowing in the open border. A light, sandy soil is most suitable.

S. arabica (Arabian). *fl.* rose-purplish. June. *l.*, upper ones deeply auriculate-amplexicaul. *h.* 1ft. 1837.

SCHRADERA (named in honour of Henry Adolf Schrader, 1767-1836, a German botanist.) SYNS. *Fuchsia* (of Swartz), *Urceolaria*. ORD. *Rubiaceæ*. A genus comprising about five species of stove, sub-epiphytal, highly glabrous shrubs, with thick, rooting branches, natives of Brazil, Guiana, the West Indies, and the Gorgona Islands. Flowers in compact, globose, terminal heads; calyx tube turbinate or hemispherical, produced above the ovary; corolla thickly coriaceous, hypocrateriform, the limb of five to ten narrow, spreading or reflexed lobes; stamens five to ten. Leaves opposite, petiolate, thickly coriaceous, oblong; stipules large, connate in a sheath. *S. cephalotes*, the only species introduced, thrives in a compost of sandy loam and peat. Propagated by cuttings, inserted in sand, under a glass, in heat.

S. cephalotes (headed). *fl.* white; corolla salver-shaped, eight to ten-lobed, the tube twice as long as the calyx. July. *l.* elliptic or lanceolate-oblong; stipules spathulate-oblong, blunt, as long as the petioles. *h.* 4ft. Jamaica, 1820.

SCHRANCKIA (named after F. P. Schrank, 1747-1835, a German botanist). Sensitive Briar. Including *Leptoglottis*. ORD. *Leguminosæ*. A genus comprising about half-a-score species of stove or hardy herbs or sub-shrubs, often prostrate, armed with recurved prickles, natives of America. Flowers rose or purplish, in globose heads or cylindrical spikes; calyx small; petals connate in the middle, and forming a funnel-shaped corolla. Pods linear, acute or acuminate, prickly. Leaves bipinnate, often sensitive; leaflets small; stipules bristly. The under-mentioned species merit attention on account of their leaves, which fall at the slightest touch. The plants thrive in a mixture of loam, peat, and sand. Propagation may be effected by young cuttings, inserted in sand, under a bell glass, in heat; or by separating the root tubers.

S. aculeata (prickly). *fl.* red, in solitary heads. July. *l.* with two or three pairs of pinnæ, each pinna bearing numerous pairs of leaflets. Stem tetragonal. Roots creeping. *h.* 1ft. to 2ft. Vera Cruz, 1733. Stove, herbaceous perennial.

S. uncinata (hooked). Sensitive Briar. *fl.* rose-coloured, in round heads. June to August. Pods 2in. long, densely prickly. *l.*, leaflets elliptic, reticulated with veins beneath; partial petioles four to six pairs. Prickles hooked. *h.* 2ft. South United States, &c., 1789. Half-hardy, herbaceous perennial.

SCHREBERA (of Thunberg). A synonym of **Hartogia** (which *see*).

SCHUBERTIA (of Martius). A synonym of **Physianthus** (which *see*).

SCHUBERTIA (of Mirbel). A synonym of **Taxodium** (which *see*).

SCHULTESIA (of Roth). A synonym of **Wahlenbergia** (which *see*).

SCHWÆGRICHENIA. A synonym of **Anigozanthos** (which *see*).

SCHWANNIA (named in honour of Theodor Schwann, a physician at Bonn). SYN. *Fimbriaria*. ORD. *Malpighiaceæ*. A small genus (five species) of stove, evergreen, climbing shrubs, confined to Brazil. Flowers red; calyx deeply five-cleft, with eight glands; petals shortly clawed, fringed; stamens six, unequal, all fertile; filaments unequally monadelphous, glabrous; umbels or racemes four-flowered, often paniculate, terminal; peduncles bracteate at base, bibracteolate at apex. Leaves opposite, entire, petiolate, glandless; stipules inconspicuous. *S. elegans*, the only species introduced, is a desirable shrub, thriving in a compost of loam, leaf mould, and sand. It may be increased by ripened cuttings, inserted in sand, under a glass, in heat.

S. elegans (elegant). *fl.*, petals pubescent; umbel paniculate; stamens scarcely exserted; peduncles and calyx silky. June. *l.* ovate or sub-orbicular, acuminate, beneath softly and densely pubescent; petioles having four to six glands. Branchlets silky. 1842.

SCHWARTZIA. A synonym of **Norantea** (which *see*).

SCHWEIGGERIA (named in compliment to Aug. Frid. Schweigger, 1783-1821, Professor of Botany at Königsburg, one of the authors of a Flora of Erlangen). Foreign Violet. SYN. *Glossarrhen*. ORD. *Violarieæ*. A genus comprising only a couple of species of beautiful, erect, stove shrubs; one is Brazilian, the other Mexican. Three outer sepals larger than the two narrow, inner ones; petals spurred at base; peduncles axillary, one-flowered, articulated above the bracts. Leaves alternate; stipules minute. *S. pauciflora*, the only species introduced, succeeds in a mixture of loam, peat, and sand. It may be increased by young cuttings, which will strike readily, if inserted in sand, under a hand glass, in heat.

S. pauciflora (few-flowered). *fl.* white. December. *l.* tapering much to the base, obovate-spathulate, obtuse, crenate-serrated. *h.* 4ft. to 6ft. Brazil, 1838. (B. R. 1841, 40.)

SCHWENKFELDA. A synonym of **Sabicea** (which *see*).

SCHWENKIA (named after J. T. Schwenck, 1619-1671, a Professor of Medicine at Jena). SYNS. *Chætochilus*, *Mathea*, *Matthisonia*. ORD. *Solanaceæ*. A genus comprising about a score species of stove herbs or sub-shrubs, natives of South America, one being also found in tropical Africa. Flowers yellowish-green or whitish; calyx five-toothed or five-cleft; corolla with an elongated tube, its limb five-toothed, with two to five club-shaped glands placed between the teeth; stamens exserted or included; peduncles one-flowered or simply few-flowered, paniculate. Leaves entire, ovate or narrow. *S. americana*, probably the only species in cultivation, is an annual, thriving in any light soil. It may be multiplied by seeds.

S. americana (American). *fl.* lilac; corolla ½in. long; pedicels scarcely longer, or shorter, than the calyx; panicle slender, many-flowered. August. *l.* petiolate; lower ones ovate, 1in. to 1½in. long, narrowed at base; upper ones oblong; floral ones minute. *h.* 2ft. Brazil, &c., 1781.

SCHWEYCKERTA. A synonym of **Limnanthemum** (which *see*).

SCIADOCALYX. Included under *Isoloma*.

SCIADOPHYLLUM (from *skias*, *skiados*, a shade or canopy, and *phyllon*, a leaf; the leaves are large, and, consequently, afford much shade). Sometimes erroneously spelt *Sciodaphyllum*. SYN. *Actinophyllum*. ORD. *Araliaceæ*. A genus comprising about twenty-two species of stove or greenhouse trees or shrubs, inhabiting tropical America. Flowers hermaphrodite or polygamous; petals

Sciadophyllum—*continued.*

five, rarely four; heads or small umbels disposed in simple racèmes, paniculate, or umbellate. Leaves digitately compound; leaflets entire; stipules often elongated. A selection from the introduced species is given below. They are well worth cultivating on account of their fine foliage. A mixture of loam, peat, and sand, is the most suitable soil. Propagation may be readily effected by cuttings, inserted in sand, under a hand glass, in moderate heat.

S. acuminatum (acuminate-leafleted). *fl.* yellow, in heads little larger than a pea. May. *l.*, leaflets seven to eleven, petiolulate, oblong, obliquely acuminate, coriaceous, glabrous, reticulately veined. Stems climbing. *h.* 10ft. Peru. Greenhouse.

S. Brownii (Brown's). Galapee-tree. *fl.* white, nearly capitate, in very long, compound racemes. June. *l.*, leaflets seven to eleven, nearly umbellate, petiolulate, oblong-lanceolate, glabrous, unequal, the central ones smallest. Stem arboreous. *h.* 10ft. to 15ft. Jamaica, 1793. Stove.

S. conicum (conical-flowered). *fl.* whitish-red, in heads about the size of a pea; racemes two or three, rather velvety. May. *l.*, leaflets seven to thirteen, petiolulate, oblong, abruptly acuminate, coriaceous, glabrous, reticulately veined. Stem shrubby. *h.* 10ft. Peru. Stove.

SCIADOPHYLLUM (of Blume). A synonym of **Heptapleurum** (which *see*).

SCIADOPITYS (from *skyas*, a parasol, and *pitys*, a Fir-tree; referring to the spreading whorls of leaves). ORD. *Coniferæ*. A monotypic genus. The species is a tall, but very slow-growing, hardy, evergreen tree. It thrives in rich, moist loam, and may be propagated by imported seeds. Now and then, seeds are ripened in this country.

S. verticillata (whorled).* Parasol Fir. *fl.* monœcious; male catkins terminal, somewhat globular; females solitary, growing from amongst the scaly buds. *cones* elliptic-cylindrical, 2½in. long, 1½in. in diameter. *l.* long, linear and somewhat falcate, smooth, entire, alternate, without any footstalks, tapering to an obtuse point, concave and ribbed on the under side, in close tufts of from thirty to forty at the ends of the shoots, forming a sort of whorl in the form of an extended parasol. Branches alternate or in whorls. Stem straight. *h.* 80ft. to 120ft. Japan, 1861. (G. C. 1861, p. 360, 1862, p. 23, 1872, p. 1526; G. C. n. s., xvii. p. 113, xix. p. 85; S. Z. F. J. 101-2.) There are several varieties, in addition to the following:

S. v. variegata (variegated). This differs from the type in having some of its leaves of a pale yellow, intermixed in the parasol-like whorls.

SCILLA (the old Greek name used by Hippocrates). Squill; Wild Hyacinth. Including *Barnardia* and *Ledebouria*. ORD. *Liliaceæ*. A genus embracing nearly eighty species of stove, greenhouse, or hardy bulbous plants, natives of Europe, temperate and mountainous Asia, and extra-tropical, or the mountains of tropical, Africa, with one from Chili. Flowers small or mediocre, racemose, on articulated pedicels; perianth blue, rose, or purplish, persistent for some time; segments nearly equal, distinct or very shortly connate towards the base, spreading, or rarely campanulate-connivent at base, one-nerved; stamens six, affixed at the base or below the middle of the segments; bracts small; racemes sometimes elongated and many-flowered, sometimes reduced to two or three, occasionally nearly corymbiform; scape simple, leafless. Leaves radical, linear, loriform, oblong, or nearly ovate. Bulb tunicated. *S. autumnalis*, *S. nutans*, and *S. verna*, are natives of Britain. Hardy Scillas are amongst the most beautiful of spring-flowering bulbous plants. They succeed in ordinary garden soil, and require to be planted in early autumn when the bulbs are resting. *S. sibirica* is also well suited for culture in pots; but these must be kept in a cold house or frame, and not subjected to heat. The greenhouse species succeed in sandy loam, and in pots 5in. in diameter, along with other Cape bulbs, in a cool greenhouse. Propagated by seeds, when obtainable, which is, however, a very slow process; and by offsets.

The selection of species given below includes the most popular and beautiful. Most of the descriptions are translated from Mr. Baker's admirable Monograph of the genus, which appeared in the "Journal of the Linnean

Scilla—*continued.*

Society," vol. xiii. The leaves, except where otherwise stated, are cotemporary with the flowers.

S. amœna (pleasing).* Star Hyacinth. *fl.*, perianth blue, rarely whitish, five to six lines long, the segments lanceolate; pedicels ascending ½in. to ¾in. long; raceme loosely three to six-flowered, 1in. to 3in. long; scape weak, 4in. to 6in. long. March. *l.* four or five, flaccid, lorate, ascending, glabrous, 6in. to 9in. long, ⅓in. to ⅔in. broad. Austria, Germany, &c., 1596. Hardy. (B. M. 341; J. F. A. 218; L. B. C. 1015.)

S. a. sibirica (Siberian). A synonym of *S. sibirica*.

S. amœnula (rather pretty). A synonym of *S. sibirica*.

S. autumnalis (autumnal). *fl.*, perianth reddish-purple, ½in. in diameter; pedicels ascending or spreading; racemes short; scapes several, equalling the leaves. July to September. *l.* autumnal, succeeding the flowers, narrow, 3in. to 6in. long, half-terete, grooved above. Europe (Britain), North Africa. Hardy. (B. M. 919; Sy. En. B. 1526.) The form *japonica* has beautiful rose-coloured flowers.

S. Bertheloti (Berthelot's). *fl.*, perianth pale lilac, campanulate, one line long; pedicels ascending, as long as the perianth; raceme twelve to twenty-flowered, 1in. to 2in. long; scape slender, 6in. to 8in. long. April. *l.* five or six, slender, spreading, lorate, 6in. to 12in. long, ½in. to ¾in. broad, long-attenuated. Tropical Africa, 1862. Greenhouse. (B. M. 5308.)

S. bifolia (two-leaved).* *fl.*, perianth blue, sometimes reddish or whitish, four to five lines long, the segments spreading; pedicels ascending, ⅓in. to 1in. long; raceme deltoid, three to eight-flowered, 1in. to 1½in. broad; scape solitary, 3in. to 6in. long. March. *l.* usually two, opposite, narrowed at apex, cucullate, 4in. to 8in. long, ⅓in. to ½in. broad, concave on the face. Mediterranean region, &c. Hardy. (B. M. 746; J. F. A. 117.)

S. b. præcox (early). *fl.* ten to fifteen, appearing earlier than those of the type, rather large; pedicels 1in. to 1½in. long. *l.* thicker and broader. A robust form. (S. B. F. G. ser. ii. 14, under name of *S. præcox*.) *S. rosea* is a sub-variety of this, with reddish flowers.

S. b. taurica (Taurian). *l.* usually three or four. Tauria. (R. G. 307.)

S. campanulata (bell-shaped). A synonym of *S. hispanica*.

S. chinensis (Chinese).* *fl.*, perianth rose-purple, one line long; bracts whitish, minute; pedicels ascending, about ⅛in. long, the lower ones often twin; raceme somewhat dense, twenty to sixty-flowered, 1in. to 2in. long; scape slender, straight, 1ft. or more long. June. *l.* two or three, equalling or exceeding the scape, rather hard, acute, channelled down the face. China, 1826. Half-hardy. SYN. *Barnardia scilloides* (B. M. 3788; B. R. 1029).

S. concinna (neat). *fl.*, perianth rose-purple within, oblong-campanulate, ⅛in. long; pedicels all erecto-patent, four to five lines long; raceme dense, twenty to thirty-flowered, oblong, 1½in. to 2in. long; scape firm, erect, terete, 2in. to 6in. long. Spring. *l.* three or four, nearly erect, linear, 8in. to 9in. long, ⅓in. to ⅔in. broad, profusely purple-spotted at back. South Africa, 1862. Greenhouse. (Ref. B. 235.)

S. concolor (one-coloured). *fl.*, perianth greenish, rounded, campanulate, about ⅛in. long; pedicels two to four lines long, the lower ones drooping; racemes dense, thirty to fifty-flowered, oblong-cylindrical, 3in. to 4in. long; scapes one to three, flexuous, 3in. to 4in. long. Spring. *l.* five or six, falcate, ligulate-lanceolate, 5in. to 8in. long, 1¼in. to 1½in. broad, obtuse or sub-acute, very slightly narrowed at base, unspotted. South Africa, 1862. Greenhouse. SYN. *Drimia Cooperi* (Ref. B. 18).

S. Cooperi (Cooper's). *fl.*, perianth bright purple, drooping, campanulate, ⅛in. long, the divisions reflexed from half-way down when expanded; pedicels ⅜in. to ½in. long, spreading, or the lowest slightly nodding; raceme moderately dense, thirty to fifty-flowered, 2in. to 3in. long, 1in. broad; scape firm, erect, 4in. to 5in. long. Spring. *l.* four or five, ascending, 10in. to 12in. long, ⅓in. to ⅔in. wide, green, streaked and spotted with purple on the back downwards. Cape of Good Hope, 1866. Greenhouse. (B. M. 5580.)

S. Cupani (Cupani's). *fl.*, perianth blue, ⅓in. long, the segments oblong-obtuse; bracts whitish, slightly ciliated, ⅓in. to ⅔in. long; pedicels ascending, 1in. to 2in. long; raceme loosely six to twelve-flowered, sub-corymbose or deltoid, 1½in. to 2in. long and broad; scape slender, flexuous, 3in. to 6in. long. June. *l.* six to eight, lorate-lanceolate, spreading, 3in. to 4in. long, six to eight lines broad, the margins pellucid and minutely ciliated. Sicily, 1834. Hardy. (B. R. 1878.)

S. floribunda (bundle-flowered). *fl.*, perianth greenish without, rose-purple within; pedicels six to eight lines long, the central ones spreading, the lower ones drooping; raceme rather dense, containing sixty to a hundred or more flowers, 6in. to 8in. long, 2in. broad; scape erect, 6in. to 9in. long. Spring. *l.* nearly erect, lorate, about 1ft. long, 1¾in. to 2in. broad, acute, scarcely narrowed at base, pale green, with large blotches of deeper green. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 188.)

S. hispanica (Spanish).* Large or Spanish Bluebell or Squill. *fl.*, perianth usually blue, but often changing to rose-purple or

Scilla—*continued.*

whitish, sub-globose-campanulate, ½in. to ¾in. long; lower pedicels ½in. to 1in. long; raceme equilateral, rather loosely six to twelve-flowered; scape 6in. to 9in. long. May. *l.* five or six, glabrous, ascending, linear-lorate, ½in. to ¾in., or in cultivated specimens 1in., broad, sub-obtuse, convex at back. Spain and

FIG. 447. SCILLA HISPANICA, showing Habit and detached Single Flower.

Portugal, 1683. Hardy. See Fig. 447. SYNS. *S. campanulata* (B. M. 127), *S. patula*, *Agraphis paniculata*. The variety figured in B. M. 1102 has spreading, rather smaller flowers. The following forms, quoted in nurserymen's catalogues, differ in the colour of the flowers: *alba*, pure white; *aperta*, light blue; *a. purpureo-striata*, light blue, with deeper stripe; *carnea*, flesh-coloured; EMPEROR, porcelain, lined blue, very large and beautiful.

S. Hughii (Hugh's). A form of *S. peruviana glabra*.

S. humifusa (prostrate). *fl.*, perianth reddish-green, small; pedicels one line long; raceme 3in. to 4in. long; scape 3in. to 4in. long, purple at base, green above. Spring. *l.* two or three, cordate-oblong, 3in. to 4in. long, 1½in. to 2in. broad, pale green, with a few blotches of a darker tint. Natal, 1881. Greenhouse.

S. hyacinthoides (Hyacinth-like).* *fl.*, perianth bluish-lilac, about ½in. long, the segments ligulate, puberulous at apex; bracts whitish, minute, persistent; pedicels erecto-patent, the lower ones 1in. to 1¼in. long; racemes containing fifty to a hundred and fifty flowers, 6in. to 18in. long, 2in. to 2½in. broad; scape straight, 1ft. to 2ft. or more long. August. *l.* ten to twelve, spreading, 1ft. to 1½ft. long, ½in. to 1¼in. broad, narrowed to both ends, minutely ciliate-denticulate on the margins. Mediterranean region, 1585. Hardy. (B. M. 1140.)

S. indica (Indian). *fl.*, perianth greenish-purple, ⅛in. to ¼in. long, somewhat rounded-campanulate, the segments falcate; pedicels somewhat spreading, three to four lines long; raceme dense, thirty to sixty-flowered, oblong-cylindrical, 2in. to 4in. long; scapes one to three, flexuous, 2in. to 6in. long. June. *l.* five or six, oblong or lanceolate, acute, often with tiny bulbils on the margins, narrowed at base, 3in. to 6in. long, ½in. to 1¼in. broad. India, 1816. Stove. SYN. *Ledebouria hyacintha* (B. M. 3226).

S. italica (Italian). *fl.*, perianth blue, nearly or quite ¼in. long, segments puberulous at apex; bracts twin; raceme dense, six to thirty-flowered, at first conical, when expanded 1in. to 2in. long, ¾in. to 1in. broad; scape solitary, slender, 6in. to 10in. long. May. *l.* four to six, lorate, flaccid, spreading, acute, carinate, 4in. to 8in. long, ⅓in. to ½in. broad, narrowed at apex. Italy, &c., 1605. Hardy. (B. M. 663; L. B. C. 1483.) *S. purpurea* is a robust garden form of this species with more deeply-coloured flowers.

S. lanceæfolia (lance-leaved). *fl.*, perianth sub-globose-campanulate, nearly ¼in. long, the segments purple within, greenish at back, ligulate-lanceolate; pedicels five to six lines long, the lower ones deflexed; raceme dense, thirty to fifty-flowered, oblong, 2in. to 3in. long, 1¼in. to 1½in. broad; scapes one to three, firm, terete, 2in. to 4in. long, often decurved. May. *l.* six to eight, somewhat spreading, oblong, acute, 4in. to 6in. long, 1½in. to 2in. broad, very slightly narrowed at base, pale green and spotted on the face. Cape of Good Hope, 1818. Greenhouse. (Ref. B. 182.) SYNS. *Drimia acuminata* (L. B. C. 1041), *Lachenalia lanceæfolia* (B. M. 643).

Scilla—*continued.*

S. l. ovatifolia (ovate-leaved). *l.* shorter than in the type, broadly ovate, 2in. to 3in. long, 1½in. to 2in. broad. 1862. SYN. *S. ovatifolia* (Ref. B. 183).

S. lanceolata (lanceolate). *fl.*, perianth greenish-purple, tubular-campanulate, ⅓in. long; pedicels dotted with red, somewhat spreading, the lower ones 5in. to 6in. long; raceme very loose, eight to twelve-flowered, 1½in. to 2in. long, 1½in. broad; scape flexuous, 4in. to 5in. long. September. *l.* five or six, lanceolate, acute, 3in. to 4in. long, eight to ten lines broad, green, unspotted. Cape of Good Hope, 1774. Greenhouse. SYNS. *Drimia lanceolata*, *Lachenalia reflexa* (A. B. R. 299).

S. latifolia (broad-leaved). *fl.*, perianth lilac, campanulate, ⅛in. long, the segments ligulate; pedicels spreading, the lower ones five to seven lines long; raceme dense, thirty to sixty-flowered, 3in. to 4in. long, 1in. to 1¼in. broad; scape straight, 1ft. or more long. May. *l.* six to nine, enveloping the base of the scape, lanceolate, slender, 1ft. to 1¼ft. long, 1½in. to 2in. broad, narrowed at base and apex, the margins glabrous. Canary Islands, 1777. Greenhouse. *S. lusitanica* (B. M. 1999) is only a robust garden form of this species.

S. linearifolia (linear-leaved). *fl.*, perianth greenish outside, purple within, nearly or quite ¼in. long, oblong-campanulate, the segments falcate; pedicels three to five lines long, the lower ones drooping; raceme rather dense, thirty to forty-flowered, oblong, 2in. to 3in. long, 1¼in. to 1½in. broad; scape flexuous, 3in. to 4in. long. Spring. *l.* four to six, nearly erect, linear, 9in. to 12in. long, four to eight lines broad, acute, very slightly narrowed at base, pale green, purple-spotted at back. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 184.)

S. livida (livid). *fl.*, perianth green, tinged on the outside with very dull purple, ⅓in. long, oblong; pedicels erecto-patent, ¼in. to ⅓in. long; raceme dense, oblong, 3in. to 4in. long, fifteen to sixteen lines broad; scape terete, 4in. to 5in. long. July. *l.* six to eight in a rosette, sessile, lanceolate, 6in. to 8in. long, 1in. to 1¼in. broad, gradually narrowed to an acute point, green and unspotted. Cape of Good Hope, 1883. Greenhouse.

S. lorata (lorate-leaved). *fl.*, perianth livid-purple, the segments tinged with green at back and on the margins, three to four lines long, oblong-campanulate; pedicels four to five lines long, the lower ones drooping; raceme rather dense, thirty to sixty-flowered, oblong-cylindrical, 3in. to 4in. long, 1½in. to 1¾in. broad; scape terete, erect, 8in. to 9in. long, spotted below. Spring. *l.* five or six, nearly erect, lorate-lanceolate, 8in. to 9in. long, ten to twelve lines broad, acute, slightly narrowed at base, green, purple-spotted at back. Cape of Good Hope, 1862. Greenhouse. SYN. *Drimia apertiflora* (Ref. B. 19).

S. lusitanica (Portuguese). A form of *S. latifolia*.

S. Macowani (MacOwan's). *fl.*, perianth greenish both inside and out, campanulate; raceme dense, conical, twenty to thirty-flowered; scape equalling the leaves. May. *l.* three or four, linear, green. *h.* 6in. South Africa, 1873. Greenhouse. This resembles *S. Cooperi*, but is inferior to that species from a horticultural standpoint.

S. maritima (sea-loving). A synonym of *Urginea maritima*.

S. microscypha (small-cupped). *fl.*, perianth green; racemes dense, 5in. to 6in. long; scape green, as long as the leaves. Spring. *l.* two or three, cordate-oblong, 1ft. long, 4in. to 4½in. broad, glaucous-green, marked near the base beneath with purplish-brown bars, and with darker green stripes higher up. Natal, 1881. Greenhouse.

S. monophylla (one-leaved). *fl.*, perianth blue, campanulate, three to four lines long; pedicels ascending, the lower ones ⅓in. to 1in. long; racemes loose, six to twenty-flowered, 1in. to 2½in. long, 1¼in. to 1½in. broad; scape slender, flexuous, 3in. to 6in. long. May. *l.* usually solitary, inclosing the base of the scape, ascending, lorate, 6in. to 9in. long, six to eight lines broad, acute at apex. Spain, Portugal, 1821. Hardy. SYN. *S. pumila* (B. M. 3023).

S. natalensis (Natal). *fl.*, perianth blue, three to four lines long, the segments stellate, spreading; bracts solitary; pedicels ascending, the lower ones ¾in. to 1in. long; raceme dense, containing fifty to a hundred or more flowers, 6in. to 12in. long, 2½in. to 3in. broad; scape erect, terete, four to six lines thick, 1ft. to 1½ft. long. April. *l.* four to six, lorate-lanceolate, green, glabrous, 9in. to 12in. long, 3in. to 4in. broad, ascending, narrowed and acute at apex. Natal, 1862. Greenhouse. (B. M. 5379; F. d. S. 1043.)

S. n. sordida (mean). *fl.* smaller and fewer than in the type; scape slender. *l.* tinged with brown, 7in. to 8in. long, 1¼in. to 1½in. broad.

S. nonscripta (undescribed). A synonym of *S. nutans*.

S. nutans (nodding).* Bluebell; Harebell; Wild Hyacinth. *fl.*, perianth blue, purple, white, or pink, drooping; bracts in pairs; pedicels short, curved, erect in bud and fruit; raceme six to twelve-flowered; scape solitary, tall, stout. April to June. *l.* 10in. to 18in. long, ½in. broad, sub-acute, concave. Western Europe (Britain). SYNS. *S. nonscripta*, *Agraphis nutans*, *Hyacinthus nonscriptus*. See Fig. 448. (Sy. En. B. 1528.) The following are garden forms: *grandiflora alba*, large white; *rosea*, rose; *rubra*, red-flowered.

Scilla—*continued.*

S. odorata (fragrant). *fl.* fragrant; perianth blue, campanulate, ⅓in. long, the segments oblong; pedicels ascending, the lower ones 4in. to 6in. long; raceme loose, six to twenty-flowered, 1in. to 2½in. long, 1¼in. to 1½in. broad; scape slender, flexuous, 3in. to 6in. long. May. *l.* three or four, glabrous, 6in. to 9in. long, three to four lines broad, sub-obtuse, channelled down the face, long-narrowed below. Spain and Portugal, 1818. Hardy.

FIG. 448. SCILLA NUTANS.

S. ovatifolia (ovate-leaved). A synonym of *S. lanceæfolia ovatifolia.*

S. pallidiflora (pale-flowered). *fl.*, perianth whitish, tinged with green, campanulate, the segments oblong, sub-obtuse; pedicels straight, the lower ones horizontally spreading, 1in. to 1¼in. long; raceme dense, containing a hundred to a hundred and fifty or more flowers, at first conical, 6in. to 10in. long, 3in. broad: scape erect, 1½ft. or more long. Spring. *l.* five or six, lorate-lanceolate, ascending, 1ft. to 1¼ft. long, 1in. to 1¼in. broad, glabrous, green. Cape of Good Hope, 1870. Greenhouse. (Ref. B. 179.)

S. patula (spreading). A synonym of *S. hispanica.*

S. pauciflora (few-flowered). *fl.*, perianth greenish, rounded-campanulate, nearly or quite ¼in. long, the segments falcate; pedicels five to six lines long, the lower ones drooping; raceme loose, twenty to thirty-flowered, oblong, 3in. to 4in. long, 1¼in. to 1½in. broad; scape firm, unspotted, terete, 3in. to 4in. long. Spring. *l.* a pair, opposite, or rarely three, spreading, oblong-lanceolate, acute, undulated, 2½in. to 3in. long, nine to ten lines broad, pale green and spotted on the face, narrowed at base. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 181.)

S. pendula (pendulous). *fl.*, perianth greenish outside, purple within, ⅓in. long, oblong-campanulate; pedicels very slender, ⅔in. to 1¼in. long, drooping; raceme rather dense, thirty to sixty-flowered, 3in. to 6in. long, 2½in. to 3in. broad; scape very slender, flexuous, 8in. to 9in. long. Spring. *l.* lorate, 1ft. to 1¼ft. long, about 1¼in. broad, acute, narrowed at base, nearly flat, pale green obsoletely spotted. Cape of Good Hope, 1862. Greenhouse.

FIG. 449. SCILLA PERUVIANA, showing Habit and detached Single Flower.

S. peruviana (Peruvian).* Cuban Lily. *fl.*, perianth lilac, reddish, or whitish, five to six lines long, the segments green-striped; bracts whitish, persistent, solitary, 1in. to 2in. long; raceme very dense, comprising fifty to one hundred or more flowers, at first deltoid, at length 4in. to 6in. long and broad; scape robust, striated, 6in. to 12in. long. May. *l.* six to nine, lorate, 6in. to 12in. long, eight to twelve lines broad, narrowed at base and apex, the margins densely ciliated with minute, white bristles. Mediterranean region, 1607. Hardy. The name of this species has no reference to its native place. See Fig. 449. (B. M. 749.) *alba* is a white-flowered garden form.

S. p. glabra (smooth). *fl.*, perianth lilac; lower pedicels 1½in. to 2in. long. *l.* glabrous on the margins. 1873. *S. Hughii* is a more robust form, having scape, pedicels, and bracts, tinged with red, and leaves 1½in. to 2in. broad.

S. plumbea (lead-coloured). *fl.*, perianth dirty-blue, ¼in. long, campanulate; lower pedicels somewhat spreading, six to eight lines long; raceme fifteen to twenty-flowered, 3in. to 3½in. long, 1½in. to 1¾in. broad. May. *l.* lorate-lanceolate, nearly 1ft. long, 1¼in. broad, acute, glabrous, unspotted. Cape of Good Hope, 1812. Greenhouse. Closely allied to, and perhaps synonymous with, *S. natalensis.* (B. R. 1355.)

S. prasina (green). *fl.*, perianth entirely green or faintly tinged with purple, rounded-campanulate, the segments half a line broad; central pedicels horizontally spreading, ⅛in. long, the lower ones deflexed; raceme rather dense, thirty to fifty-flowered, lanceolate or sub-cylindrical, 1½in. to 2in. long, six to ten lines broad; scape flexuous, deflexed, 3in. to 4in. long. Spring. *l.* five or six, spreading, oblong-lanceolate, 4in. to 5in. long, 1in. to 1¼in. broad, acute, narrowed below, often purple-spotted. Cape of Good Hope, 1870. Greenhouse.

S. pratensis (meadow-loving).* *fl.*, perianth blue, campanulate, two lines long; pedicels four to six lines long, ascending or somewhat spreading; raceme dense, twelve to thirty-flowered, 1½in. to 2½in. long, 1½in. to 1½in. broad. May. *l.* three to six, glabrous, narrow-ligulate, 6in. to 12in. long, two to four lines broad, attenuated at both ends. Dalmatia, 1827. Hardy. (B. R. 1839, 63.)

S. princeps (princely). *fl.*, perianth greenish outside, reddish-purple within, oblong-campanulate, nearly or quite five lines long, the segments reflexed; pedicels 1in. to 1¼in. long, the central ones spreading, the lower ones drooping; raceme dense, comprising a hundred and fifty to two hundred flowers, 1ft. long, 3in. to 3½in. broad; scapes two or three, 7in. to 9in. long. Spring. *l.* five or six, lorate, 1½ft. to 2ft. long, 2in. to 2½in. broad, acute, narrowed at base, pale green, spotted. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 189.)

S. pumila (dwarf). A synonym of *S. monophylla.*

S. puschkinioides (Puschkinia-like). *fl.*, perianth pale blue, erect, star-like. Spring. *l.* two to four, obtuse, broadly linear. Turkestan, 1881. A pretty, hardy plant, somewhat resembling *S. bifolia* in habit. (R. G. 1051, f. 1.)

S. revoluta (revolute). *fl.*, perianth rose-purple, the falcate segments green-striped at back, rounded-campanulate, ⅛in. long; pedicels spreading, the lower ones six to eight lines long; raceme oblong-lanceolate, loose, twelve to thirty-flowered, 2in. to 3in. long, 1in. to 1¼in. broad; scape very slender, flexuous, 3in. to 6in. long, at first nodding at apex, coloured at base. August. *l.* five to nine, oblanceolate-spathulate, channelled and narrowed at base into a short petiole, 2½in. to 3in. long, six to eight lines broad, slightly wrinkled. Cape of Good Hope, 1774. Greenhouse. SYN. *Drimia lanceæfolia* (L. B. C. 278).

S. sibirica (Siberian).* *fl.* one to three, horizontal or slightly drooping, shortly pedicellate; perianth deep blue, six to seven

Scilla—*continued.*

FIG. 450. SCILLA SIBIRICA, showing Habit and detached Single Flower.

lines long; scapes one to six, fleshy, 3in. to 6in. long. February. *l.* two to four, ascending, narrow, lorate, at length 4in. to 6in. long, four to six lines broad, slightly cucullate. European Russia, Siberia, &c., 1796. Hardy. See Fig. 450. (A. B. R. 365; L. B. C. 151.) SYNS. *S. amœna sibirica* (B. M. 1025), *S. amœnula* (B. M. 2408), *S. uniflora.*

S. socialis (social). *fl.*, perianth greenish, rounded-campanulate, ⅛in. long, the segments falcate; pedicels ⅛in. long, the lower ones drooping; raceme dense, twenty to thirty-flowered, oblong, 1½in. to 2in. long, 1in. broad; scape firm, terete, unspotted, 2in. to 3in. long. Spring. *l.* three or four, spreading, oblong-lanceolate, acute, 2in. to 2½in. long, ¾in. to 1in. broad, slightly narrowed at base, pale glaucous-green and spotted on the face. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 180.)

S. spathulata (spathulate-leaved). *fl.*, perianth greenish outside, purple within, oblong-campanulate, nearly ⅛in. long; pedicels six to seven lines long, the lower ones drooping; raceme dense, thirty to forty-flowered, 3in. to 4in. long, 1½in. to 1¾in. broad; scape flexuous, 3in. to 4in. long. Spring. *l.* five or six, lorate-spathulate, 6in. to 8in. long, 1½in. to 1¾in. broad, pale glaucous-green, with deeper green and purplish blotches. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 187.)

S. sub-glauca (rather glaucous). *fl.*, perianth greenish outside, purple within, oblong-campanulate, ⅛in. long; pedicels six to seven lines long, the lower ones drooping; raceme rather loose, thirty to forty-flowered, 3in. to 4in. long, 1½in. or rather more broad; scape spotted, 3in. to 4in. long. Spring. *l.* five or six, lorate-lanceolate, 9in. to 10in. long, 1in. broad, acute, distinctly narrowed at base, pale glaucous-green on the face, purple-spotted at back. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 186.)

S. tricolor (three-coloured). *fl.*, perianth green, the segments oblong; filaments bright mauve-purple; lower pedicels spreading, ½in. or more long; raceme dense, oblong-conical, 2in. to 3in. long, 1¼in. to 1½in. broad; scape flexuous, terete, 6in. to 8in. long. Spring. *l.* six or seven, lanceolate, erecto-patent, glabrous, 1ft. long, 2in. broad, narrowed to 1in. at the channelled base, dark green, blotched on the face with lighter green, and on the back with claret-brown. Port Elizabeth, 1880. Greenhouse.

S. uniflora (one-flowered). A synonym of *S. sibirica.*

S. verna (spring). Sea Onion. *fl.* fragrant; perianth bright blue, ½in. in diameter; bracts as long as the pedicels, or longer; lower pedicels ½in. long; raceme six to twelve-flowered, sub-corymbose or deltoid, ¾in. to 1½in. broad; scapes one or two, shorter than the leaves. April and May. *l.* preceding the flowers, linear, sub-obtuse, 3in. to 10in. long, ⅛in. to ¼in. broad, recurved, concave. Europe (Britain). (Sy. En. B. 1527; F. D. 568, under name of *S. bifolia.*)

S. versicolor (various-coloured). *fl.*, perianth whitish, tinged with green, ⅕in. long, the segments ligulate, slightly obtuse; anthers blue; lower pedicels at length spreading, 1½in. to 2in. long; raceme rather dense, fifty to eighty-flowered, 6in. to 8in. long, 3½in. broad; scape erect, 6in. to 8in. long. Spring. *l.* six to eight, glabrous, ascending, linear-lorate, 6in. to 9in. long, four to six lines broad, green on both sides, acute and narrowed at apex. Cape of Good Hope, 1872. Greenhouse. (Ref. B. 305.)

S. villosa (villous). *fl.*, perianth blue, ½in. or rather more long, the segments elliptic, rather obtuse; pedicels erecto-patent, the lower ones ¾in. to 1¼in. long; raceme sub-corymbose, six to eight-flowered; scape 2in. to 3in. long. Spring. *l.* three or four, lorate, spreading, 3in. to 5in. long, ¼in. to ½in. broad, ciliated, loosely pilose on the face, channelled below. Barbary, 1831. Hardy. (B. M. 3211.)

S. zebrina (zebra-striped). *fl.*, perianth greenish and purple, rounded-campanulate, ¼in. long; pedicels ¼in. to ½in. long, the lower ones drooping; raceme dense, thirty to forty-flowered; scape 4in. to 6in. long, spotted below. Spring. *l.* five or six, ligulate-lanceolate, nearly erect, 8in. to 12in. long, 1in. to 1¾in. broad, acute, slightly narrowed at base, glaucous-green above, below copiously marked with parallel, vertical bars, and towards the base also with horizontal bars, passing into blotches of purple. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 185.)

SCIMITAR PODS. The pods of *Entada scandens.*

SCINDAPSUS (from *Skindapsos*, an old Greek name for an Ivy-like plant). ORD. *Aroideæ* (*Araceæ*). A genus comprising about nine species of tall, robust, climbing, stove shrubs, natives of tropical Asia, the Indian Archipelago, New Guinea, and the Fiji Islands. Flowers all perfect, densely disposed on a sessile, cylindrical, inappendiculate, hermaphrodite spadix; spathe cymbiform, thick, longer than the spadix; peduncle terminal, short, thick. Leaves ovate, oblong, or oblong-lanceolate, acuminate; petioles elongated, sheathing at apex. *S. officinalis*, the only species introduced, requires culture similar to **Caladium** (which *see*). Some of the plants formerly included here are now placed under *Rhaphidophora.*

S. argyræa (silvery). *l.* thickly coriaceous, of a beautiful green, unspotted, or with numerous silvery spots, obliquely cordate-ovate, very inequilateral, 4in. to 6in. long, 2½in. to 3½in. broad, shortly and acutely acuminate, the posterior lobes rounded; petioles 1½in. to 2in. long. Stem climbing, the internodes 3in. to 4in. long. Philippine Islands, 1859. SYN. *Pothos argyræa* (of gardens).

S. officinalis (officinal). *fl.*, spathe green outside, dirty-yellow within, four times as long as the thick peduncle, long-cuspidate; spadix very thick, attenuated at both ends. May. *l.* as long as the petioles, emarginate at apex, ovate-oblong, rounded or loosely cordate-emarginate at base, abruptly long-cuspidate at apex. *h.* 4ft. India, 1820.

S. picta (painted). *fl.*, spathe cuspidate, about 2½in. long; spadix very shortly stipitate, cylindroid; peduncle rather shorter than the petioles. *l.* obliquely oblong, inequilateral, rounded or slightly cordate at base, narrowed at apex into a cusp, coriaceous, dark green above, clouded and irregularly spotted, paler and unspotted beneath, 4in. to 5½in. long. Java.

SCIODAPHYLLUM. *See* **Sciadophyllum.**

SCION. A twig employed for grafting; a young shoot.

SCIOPHYLLA. A synonym of **Maianthemum** (which *see*).

SCIRPEÆ. A tribe of *Cyperaceæ.*

SCIRPUS (the old Latin name used by Pliny, &c., for a Rush). Club Grass or Rush. Including *Holoschœnus* and *Isolepis.* TRIBE *Scirpeæ* of ORD. *Cyperaceæ.* An extensive genus (about 300 species have been quoted) of stove, greenhouse, or hardy, annual or perennial, marsh or water plants, broadly dispersed. Flowers all hermaphrodite, or the upper ones rarely male, several or many to a spikelet; stamens three or fewer; inflorescence variable. Leaves few at the base of the stem, sometimes very long, sometimes small and grass-like, or all reduced to sheaths. Nine species are found in Britain, of which the best-known is *S. lacustris.* This grows freely in any boggy soil; it may be increased by seeds, by suckers, or by divisions. The other species may be similarly treated.

S. Holoschœnus variegatus (Holoschœnus, variegated). *fl.*, spikelets minute, crowded into heads from ¼in. to ½in. in diameter; stigmas three. Summer. Stems erect, terete, with alternate zones of whitish and green. A very ornamental, hardy plant. *h.* 1ft. to 1½ft. The green-stemmed type has a wide distribution, and is taller and more vigorous; it occurs on sandy sea-coasts in Europe (North Devon), North Africa, and Siberia.

S. lacustris (stream-loving). Bast; Bullrush. *fl.*, glumes glabrous, mucronate or awned, obtusely two-lobed; spikelets red-brown, one to six, ¼in. to ½in. long, sessile; cymes terminal, branched; branches few, ½in. to 3in. long. July and August. *l.* wanting, or short, flat, and keeled in still water, or long and strap-shaped in streams. Stems terete or nearly so, 1ft. to 8ft. high. Arctic Europe (Britain), &c. This plant is extensively used in making chair-bottoms, mats, &c., in most parts of Europe.

S. riparius (riverside-loving). *fl.*, spikes numerous and clustered, in a one-sided, compound, umbel-like panicle, the principal rays of which mostly surpass the involucral leaf; involucellate bracts small, scale-like, and rusty-scarious; scales of the spike rusty- or chestnut-brown, scarious, with a salient midrib extended into a mucronate point. Culm terete, very tall and stout, from a deep running rootstock, naked; the sheaths at the base bearing a short and imperfect leaf, or none. Extra-tropical regions. A favourite plant for conservatory decoration. SYN. *Isolepis gracilis* (of gardens).

S. setaceus (bristly). *fl.*, spikelets one to three, lateral, ⅛in. to ¼in. long, ovoid; glumes green and brown, ovate, obtuse. July

Scirpus—*continued.*

and August. *l.* one or two, narrow, channelled, short and bristly. Stems filiform, 3in. to 6in. long, tufted, rigid. Europe (Britain). This is similar to *S riparius* in appearance. (Sy. En. B. 1594.) SYN. *Isolepis setacea.*

S. Tabernæmontani zebrina (Tabernæmontana-like, striped) Banded Rush. *l.* erect, terete, transversely banded with white and green, generally in nearly equal zones of about half an inch deep. The appearance suggested by a group of the stems is that of a cluster of porcupine quills. *h.* 2ft. to 3ft. Japan, about 1881. SYN. *Juncus zebrinus* (I. H. n. s., 393). The green-stemmed type is found in all temperate climates.

SCISSORS. Scissors are used by gardeners chiefly for thinning the berries in bunches of grapes, and by flower-workers for cutting stems of flowers, &c., when making buttonhole and other bouquets. For this latter purpose the Scissors used should have short, strong blades, and sharp points. Grape Scissors have long blades, tapering to a point, which should not be too sharp, or there is a danger, when using them, of pricking the berries that are to remain. Scissors may be procured in several sizes: a medium size, rather than either extreme, is found most generally useful.

SCITAMINEÆ. A natural order of usually perennial herbs, with creeping rhizomes, broadly dispersed over the warmer regions of the globe. Flowers hermaphrodite or rarely polygamous, irregular, naked or bracteate, spicate, racemose, or panicled; perianth normally double, superior, the outer part calycine, the inner corolla-like, the segments variously connate, or one or other deficient; ovary inferior, three, rarely one or two-celled; stamens sometimes five, equal, free, the sixth deficient or small, often only one perfect, and the rest changed into irregular, polymorphous, variously connate, petaloid staminodes; style terminal, elongated, undivided. Fruit crowned by the persistent calyx, or the whole perianth deciduous, three-celled, or by abortion one or two-celled, sometimes fleshy and indehiscent, sometimes loculidally three-valved; seeds one or many. Leaves variously disposed, the petiole usually forming a sheath, the blade sessile or petiolate above the sheath, often large. Arrow-root, the starch derived from the rhizomes of *Maranta arundinacea*, is recommended for its digestibility. "The root of ginger (*Zingiber officinale*) . . . . is considered in India to be anti-scorbutic and aphrodisiac. . . . . The fruits of *Amomum*, called Cardamoms, are employed as a condiment, and esteemed for their stomachic qualities. . . . . The Banana and Plantain fruits (*Musa paradisiaca* and *M. sapientum*) afford an agreeable, sweet, farinaceous food, and a refreshing drink" (Decaisne and Le Maoût). Several other species are of great economic value. *Canneæ*, *Maranteæ*, *Museæ*, and *Zingibereæ*, are regarded by the authors of the "Genera Plantarum" as tribes of *Scitamineæ*. The order embraces thirty-six genera and about 450 species. Among well-known examples the following may be cited: *Alpinia*, *Canna*, *Curcuma*, *Hedychium*, *Maranta*, *Musa*, and *Zingiber*.

SCIUROIDEOUS. Like a squirrel's tail.

SCLAREA. Included under **Salvia** (which *see*).

SCLERANTHUS (from *skleros*, hard, and *anthos*, a flower; alluding to the indurated perianth). Knawel. ORD. *Illecebraceæ.* A genus comprising about ten species of small, weedy herbs, distributed throughout Europe, East Asia, Africa, Australia, and New Zealand. *S. annuis*, and its variety *biennis*, and *S. perennis*, are British plants.

SCLERIA (from *skleria*, hardness; alluding to the indurated fruit). Nut Rush. ORD. *Cyperaceæ.* A large genus (about 100 species) of stove, greenhouse, or hardy, dwarf or tall herbs, broadly dispersed over tropical and sub-tropical regions, and extending as far as temperate North America. Flowers unisexual; spikelets small, often fascicled; hypogynous bristles none; bracts at the base of the cyme or panicle leafy. Leaves sometimes grass-like and flaccid, sometimes long, broad, and plicate-nerved.

Scleria—*continued.*

Of the few species introduced, two examples are here described. Both are hardy. For culture, *see* **Cyperus.**

S. ciliata (hair-fringed). *fl.*, sterile spikes large, many-flowered; clusters terminal; sheaths pubescent June to August. *l.* two, narrow-linear, rigid, smooth, or with scattered hairs on the margins. Culms slender, rigid, 1½ft. to 2ft. high, smooth below, sparingly fringed on the angles above. South United States, 1823.

S. verticillata (whorled). *fl.*, spikes small; clusters four to six, erect, scattered near the summit of the culm, forming an interrupted spike. June and July. *l.* narrow-linear or filiform, smooth. Culms very slender, 6in. to 12in. high, smooth. North America, 1825.

SCLEROGEN. "The hard matter deposited by some plants in the interior of their cells, as in those forming the shell of the walnut" (Lindley).

SCLEROID. Hard.

SCLERONEMA. A synonym of **Xeronema** (which *see*).

SCLEROPTERIS. A synonym of **Cirrhæa** (which *see*).

SCLEROTHAMNUS (from *skleros*, hard, and *thamnos*, a shrub; alluding to the rigid aspect of the bush). ORD. *Leguminosæ.* A monotypic genus, now included, by Bentham, under *Eutaxia.* The species is a very ornamental, glabrous, divaricate or diffuse, greenhouse, evergreen shrub. For culture, *see* **Chorizema.**

S. microphyllus (small-leaved). *fl.* yellow, small, on axillary pedicels; calyx having acute or acuminate lobes; standard ¼in. or more long; petals shorter, the keel deeply coloured. May. *l.* usually elliptic-oblong or linear, one to three lines long, rigid, concave, obtuse or almost acute. Branches rigid, sometimes short and ending in slender spines, sometimes elongated, slender, and erect. Australia, 1803. The proper name of this shrub is *Eutaxia empetrifolia.*

SCLEROTIA (from *skleros*, hard). Small, hard bodies, produced by many Fungi belonging to various groups. They exhibit variations in size, colour, and form, but agree in being made up of very closely interwoven mycelium. The outer layer of the Sclerotium is peculiarly dense, and is formed of hyphæ so adherent to one another, and with so many cross walls, as to resemble true parenchyma in appearance. Sclerotia vary considerably in size, from the minute *S. cepævorum* (which gives rise to *Mucor subtilissimus* on Onions), resembling a grain of gunpowder, to the size of a large pea in the Sclerotia of some Agarics. They are usually

FIG. 451. SCLEROTIUM OF PEZIZA POSTUMA (natural size), with two Cups on slender stalks.

round or oval (see Fig. 451), but may be irregularly lobed or elongated, as in *Ergot* of Rye. Many are black, or nearly so; others are brown, dull yellow, or white. By their texture, they are fitted to withstand extremes of temperature, and of drought or moisture, better than ordinary mycelium; and it is by means of them that many Fungi are preserved through the winter. A considerable number of Sclerotia make their appearance only on dead parts of plants in a state of decay, *e.g.*, the very common *S. semen* (like a small pea, at first white, then changing to black), which produces *Typhula*; or in dung, *e.g.*, *S. stercorarium*, from which *Coprinus stercorarius* is developed. But